

THE DOCK & HARBOUR AUTHORITY

No. 164. Vol. XIV.

JUNE, 1934

Editorial

The Port of Leith: New Grain Warehouse Opened.

The construction of a new grain warehouse at the Port of Leith has now been completed, and this warehouse was officially opened on Monday, May 28th, 1934, by Sir Frederick C. Thomson, Bart., K.C., M.P.

The necessity for building a new grain warehouse arose in 1930, as an old warehouse, which had been built in 1903, was completely destroyed by fire in January of 1930. Another warehouse had been constructed in 1928, with a capacity of about 16,000 tons, but this was found insufficient to meet the needs of trade, and it was therefore decided to build another warehouse with a capacity of 20,000 tons. This has been placed on the quay at the east end of the Imperial Dock.

The new grain warehouse is constructed entirely of reinforced concrete, and is about 160 ft. long by 143 ft. wide, with a height to roof level of 150 ft.

The storage section is provided with sixty-nine silos, each about 14 ft. by 12 ft. 6 ins., holding 1,000 quarters of grain, and sixty silos, each 14 ft. by 6 ft., holding 500 quarters of grain. The delivery section consists of a series of twenty-five delivery silos, each holding 500 quarters of grain, with an elevator tower about 150 ft. high above the ground.

Two pneumatic ship-discharging plants have also been placed on the quay of the Imperial Dock to serve this warehouse, each plant being capable of discharging 180 tons of wheat per hour from a vessel lying alongside.

Increase in Revenue of the Humber Conservancy Board during 1933.

According to the accounts of the Humber Conservancy Board the revenue from shipping dues during the past financial year amounted to £23,630, an increase of £989, equal to 4.5 per cent. over the preceding period, and contrasted with a fall each year since 1930. The "normal" receipts were £35,655, an increase of £380, and the "normal" expenditure £28,950, a decrease of £1,081. Moreover, the report showed that the number of vessels on which dues were paid was 11,713, against 11,486 in the previous period, while the net registered tonnage was higher by 296,833 tons, equal to 3.4 per cent. The net registered tonnage of vessels exempted (i.e., ships calling for bunkers only) was 488,264 tons, as compared with 558,572 tons. The yield from shipping dues was £27,199, as compared with £22,641 for 1932 and £24,178 for 1931.

Notable Sunderland Achievement.

One of the most noteworthy harbour works which have received the attention of engineers in the North-East Coast district has been the construction of the Deep Water Quay at Sunderland. It has taken three and a half years to make, but it is at last nearing completion, and it may actually be that before this note is in print the first cargo will have left the quay in its still unfinished state. The Quay is entitled to be called "deep water," for there is a depth of 30 ft. at L.W.O.S.T., and as there is a rise of 14 ft. 6 ins. on the ordinary spring tide, it will be at once seen that vessels of very considerable size can be comfortably and safely berthed. The Quay is only about half a mile from the open sea, and yet the pier works are so effective that vessels will lie at perfect safety. There is a two-storeyed reinforced concrete warehouse and transit shed, 300 ft. long and 75 ft. wide, with railway lines both back and front, which are connected up to the River Wear Commissioners' lines and thence to the London and North-Eastern Railway. The Quay is equipped with three electric level luffing cranes, each of five tons capacity, which can deliver goods from or to either floor of the transit shed, or directly between ship and road vehicles on the second storey of the building. The vehicles can then leave by a bridge leading direct to the High Street, saving a considerable length of journey.

An electric conveyor also is provided, which will deliver coal aboard a ship at the rate of 600 tons per hour, and arrangements for supplying oil bunkers to vessels requiring them are now being made, and it is expected will be available by the end of the year. This is but a very inadequate sketch of a very important work, but later full justice will be done to it. The Quay is the property of the Town Council, but an arrangement has been made for its management by the River Wear Commission for several years.

Reclamation Work at Bromborough.

All the silt which is periodically dredged out of the channel in the Mersey near Bromborough and in the Bromborough Dock is used to raise the level of surrounding land. Both at the north and at the south sides, the dock is flanked by reclamation areas. The southern area, which is nearly filled up, is enclosed by a river wall made of concrete blocks, while the northern area is surrounded by a river embankment made from sandstone rock, excavated when building the dock. In the "Port Sunlight News," of Lever Bros., the owners of the Bromborough Dock, it is stated the way in which their dredging operations are conducted are very varied.

The plant in use at Bromborough consists of a bucket ladder dredger, a pump-ashore plant, a tug and barges. The dredger, which has a capacity of 1,000 tons per hour and is able to work down to a depth of 60 ft., is non-propelling, and when working is usually moored on six anchors. While the buckets are lifting soil, the dredger is moved bodily, by means of her side moorings, from one side to the other. Arrived on the limit of her cut, she is hove ahead one or two yards by the head-chain, and is moved back to the other side, where the same procedure happens again. The dredger describes, therefore, an arc of a circle, with head anchor as centre and the head chain as radius. Every bucket of the endless chain has a capacity of 125 gallons, and about sixteen buckets are tipped per minute through a shoot into 500-ton barges for conveyance to the pump-ashore plant. The latter moored along the river wall, is equipped with two pumps, a water pump for sludging the material in the barges and a powerful centrifugal reclamation pump, which sucks the mixture of sand and water out of the barge and pumps it through a 22-inch steel pipeline a considerable distance inland. The necessary proportion of water to mud is 3 to 1; in the case of clay, 10 to 1, and sometimes even more water is necessary for mixing with hard clay. Silt, sand, clay and even rock have been removed in this way. Lately, vessels have been constructed which are able to pump the dredged materials to a distance of 20,000 ft. The capacity of this suction plant varies considerably with the nature of the materials; barges of mud have been emptied in ten minutes, while on the other hand the discharging of a clay barge took hours. Owing to the favourable situation of the Bromborough Dock, it will be possible to enlarge the Dock Estate by more than 100 acres with what would otherwise have been useless sludge.

Whitehaven Dock.

A scheme is under consideration for improving the dock facilities at Whitehaven. Sir Murdoch Macdonald, who was engaged by the Whitehaven Harbour Board to make a survey of the harbour and dock for improving the shipping facilities, has forwarded a preliminary report to the Board. This, it is understood, deals chiefly with an alternative scheme for providing dock accommodation at the south side of the harbour, and a provisional estimate places the cost at £300,000. The report has been placed before the Government Commissioner, who is conducting investigations into industrial conditions in West Cumberland.

Italian Harbour Affairs

ACCORDING to statistics which have just been published by the Istituto Centrale di Statistica, shipping at Italian ports during the first quarter of 1934 and for the preceding five years are as follows:—

Jan.-Mar.	No.	ARRIVALS and		Passengers arrived and cleared
		N.R.T.	CLEARANCES Goods unloaded and loaded (Tons)	
1934	111,512	40,935,785	8,768,080	1,056,810
1933	107,181	39,598,484	7,673,579	1,145,299
1932	104,314	37,678,536	7,286,225	1,624,959
1931	98,934	36,351,218	7,825,375	1,709,689
1930	104,895	37,336,731	9,086,222	1,740,708
1929	101,003	35,439,868	8,559,415	1,713,258

Shipping at Italian ports has thus reached during the first quarter of 1934 a higher level than during the corresponding period of 1929 with the exception of passenger traffic which has shown a considerable decrease in the course of the last few years.

It may be interesting to examine the following figures regarding the main items of imports at chief Italian harbours for the first quarter of 1934 as compared to the corresponding period of 1929:—

	COAL		CEREALS		COTTON	
	1934 Tons	1929 Tons	1934 Tons	1929 Tons	1934 Tons	1929 Tons
Genoa ...	656,338	702,499	81,492	289,316	34,458	56,078
Savona ...	251,611	368,911	—	—	92	—
Leghorn ...	192,510	241,315	12,880	33,984	532	755
Civitavecchia ...	91,041	135,402	89	23,932	—	—
Naples ...	147,965	205,126	17,922	168,939	2,147	3,378
Palermo ...	47,859	72,572	223	10,762	—	—
Catania ...	13,725	38,019	1,869	27,702	—	—
Trieste ...	23,162	34,804	4,295	22,512	5,637	8,602
Fiume ...	4,100	13,787	787	1,259	1,571	29
Venice ...	345,634	212,921	13,360	113,031	19,671	12,494
Ancona ...	69,412	56,934	707	15,228	—	—
Bari ...	15,772	39,388	598	22,273	—	—

With the exception of imports of coal at Venice and Ancona, and the imports of cotton at Fiume and Venice there has been a general drop in imports at the different ports as compared with 1929. Total imports at Genoa, Savona, Leghorn, Civitavecchia, Venice and Trieste, to speak only of the most important harbours, have shown an increase, however, when compared with 1933.

The traffic at each particular port during the first quarter of 1934 and 1933 is as follows:—

	Jan.-Mar.	ARRIVALS and		Goods loaded (Tons)
		No.	N.R.T.	
Genoa ...	1934	3,046	5,178,232	1,434,398
	1933	2,365	4,784,854	1,372,709
Savona ...	1934	918	862,242	453,509
	1933	732	712,549	370,727
Leghorn ...	1934	1,841	1,929,852	315,603
	1933	1,816	1,910,791	303,512
Civitavecchia ...	1934	729	860,795	198,346
	1933	687	907,584	188,450
Naples ...	1934	4,111	4,289,034	291,833
	1933	4,342	4,466,098	346,334
Brindisi ...	1934	540	1,251,576	34,229
	1933	782	1,208,399	35,478
Bari ...	1934	836	772,036	54,969
	1933	802	776,810	53,809
Ancona ...	1934	1,193	726,298	127,112
	1933	957	664,115	63,046
Venice ...	1934	1,877	2,209,676	670,271
	1933	1,749	2,124,838	511,741
Trieste ...	1934	6,920	2,573,477	441,743
	1933	6,838	2,527,581	326,103
Fiume ...	1934	2,485	922,121	70,918
	1933	2,442	900,638	92,321
Messina ...	1934	1,628	1,109,235	65,745
	1933	1,706	1,084,481	65,481
Catania ...	1934	1,228	967,490	96,648
	1933	934	847,550	87,280
Syracuse ...	1934	856	735,784	17,431
	1933	666	671,424	23,809
Palermo ...	1934	1,541	1,837,284	117,199
	1933	1,565	1,687,085	111,911
Cagliari ...	1934	630	435,462	67,524
	1933	579	396,721	51,513

Imports declined at Naples, Brindisi, Fiume and Syracuse, while exports declined at Leghorn, Naples, Brindisi, Venice, Catania and Palermo. As far as tonnage of ships arrived and cleared is concerned Genoa occupies first place, followed by Naples, Trieste, Venice, Leghorn, etc.

The Consiglio Provinciale dell'Economia at Trieste (Chamber of Commerce and Industry) has published the

preliminary figures for the first four months. (Note—Only the figures for Genoa and Trieste are available at present for the period January-April, 1934), from which it appears that shipping at that port has further increased during April, 1934, by about 50,000 tons in respect to the corresponding period of 1933, thus showing that the progress noticed in the early part of 1934 has not been a temporary one.

In connection with shipping at Genoa, during the first four months of 1934, the statistics which have just been published by the Consorzio Autonomo del Porto di Genova, show that imports into Genoa included 1,997,923 tons of goods and the exports 313,791 tons of goods against 1,833,709 tons of goods imported and 333,643 tons of goods exported during the corresponding period of 1933. There has been a slight decrease in exports, but if bunkers and ships' supplies are also added to the exports the total shipments from Genoa during the first four months of 1934, reaches 606,799 tons against 563,847 tons during the corresponding period of 1933. The main items of imports at Genoa during the month of April, 1934, are as follows:—

	APRIL	
	1934 Tons	1933 Tons
Coal ...	221,151	170,775
Cereals ...	31,219	38,095
Cotton ...	9,310	16,941
Wool ...	8,982	8,159
Skins ...	2,776	2,936
Phosphates ...	14,081	11,039
Oil ...	38,079	40,946
Frozen meat ...	1,353	1,226
Lumber ...	19,167	17,974
Other goods ...	152,519	137,537
	498,637	445,628

Total imports in the Port of Genoa, during the month of April, have shown an increase of about 53,000 tons due chiefly to an increase in the arrivals of coal and general cargo. There has also been an increase in the tonnage dry docked at Alle Grazie Docks of the Società Anonima Ente Bacini which, during the first four months of 1934, included 157 vessels representing 800,425 gross tons against 147 vessels and 777,844 gross tons during the corresponding period of 1933. This progress is due to a larger number of foreign ships which have been overhauled in Genoa, owing to the rapidity of the work done at the leading Italian port.

It is understood that an amount of 20,000,000 lire has just been allotted by the Italian Treasury to carry out harbour improvements at Taranto, Tricase, Gallipoli, etc., and consideration is also being given to the construction of concrete warehouses and coal elevators in the Port of Brindisi in order to meet the requirements of trade. Another project which is under consideration is the construction of an entirely new port at Merka (Italian Somaliland), under the auspices of the S.I.C.A.M. of Rome, which is carrying out constructions in the ports of Bari, Bengasi and Leghorn. The first part of the work would involve the construction of a breakwater 1,000 metres long at a depth of 35 metres and with a foundation of 10 metres, and also extensive dredging work would have to be carried out to ensure the calling of ships of 10,000 tons gross at that port.

However, the most interesting event which has taken place amongst the Italian harbours during the past month has been a commencement on the construction of the new maritime passenger station on the Beverello Mole in the Port of Naples. The construction of the quay walls on the Eastern side of the Mole being well forward it has been decided to start the construction of the maritime passenger station, which is to be completed in October, 1935. The building will be 181.50 metres in length and 27.50 metres wide. In connection with the harbour enlargements carried on at Naples it may be mentioned also that in the course of the last month six electric cranes have been placed on the Mole Cesario Console, and that an additional six electric cranes are to be erected on one of the moles in the Littorio Docks.

Canada's Maritime Ports: Expansion in 1933

Piers at the Port of Halifax, N.S., handled a record cargo tonnage last year, amounting to 849,639 tons, as against 678,828 tons in 1932.

The Saint John Harbour Commission reports total import and export cargo handled through the port to have been 1,241,150 tons last year, as against 1,101,701 tons in 1932.

Port of Leith

Opening of New Grain Warehouse, Imperial Dock

On Monday, May 28th, a new Grain Warehouse at the Imperial Dock, Leith, was officially opened. This Warehouse, which has a capacity of 20,000 tons, has been built to take the place of an old warehouse, built in 1903, and which was completely destroyed by fire in January, 1930.



New Grain Elevator and Gantry. Other Grain Elevator in distance on left.

THE first Grain Elevator Warehouse at Leith Docks was built in 1903 at the Edinburgh Dock by a private firm. It was taken over by the Leith Dock Commission in 1906 and was thereafter worked by the Commissioners as part of the dock undertaking.

The original Warehouse was capable of storing, in all, 20,000 tons of grain, and consisted of silos constructed of timber on the "inter-laced" system, the timber bins being surrounded by brick walls to protect them from the weather.

The Warehouse was served by the ship-discharging plant on the south quay of the Edinburgh Dock (which is still in use), consisting of a bucket elevator capable of discharging 350 tons of grain per hour, with two fixed pneumatic elevators of small discharging capacity.

The Dock Commissioners constructed in 1928, as an addition to the original Warehouse, a new building of about 16,000 tons capacity, bringing the storage capacity up to 36,000 tons. The new building, which was constructed of reinforced concrete, immediately adjoined the original Warehouse and was connected to it by means of a covered way, so that it could be operated together with the old Warehouse as one complete unit.

In order to serve this extension the Commissioners provided two travelling pneumatic ship-discharging machines on the south quay of the jetty of the Edinburgh Dock, and these can be placed at any point on the quay to suit the hatches of the grain vessel to be discharged.

Each of these machines can discharge 150 tons of wheat per hour from a vessel lying alongside and automatically deliver the grain, after weighing, to either of two conveyor belts in a gantry above the roof of the dock sheds. The conveyors carry the grain to the Warehouse for storage until required by the merchant.

In January, 1930, a disastrous fire completely destroyed the original 1903 Warehouse, and the Commissioners were left with the Warehouse of 16,000 tons capacity which was built in 1928.

After careful consideration the Commissioners subsequently decided to erect a new Warehouse of 20,000 tons capacity and to place it on the quay at the east end of the Imperial Dock where the depth of water is 4 ft. 6 ins. greater than that of the Edinburgh Dock.

New ship-discharging plant was, of course, required, and two pneumatic elevators have been provided on the south quay of the Imperial Dock feeding into a conveyor gantry which extends from the quay to the Warehouse.

The new building, except for its larger size, is generally similar in all material respects to the 1928 Warehouse now in use at the Edinburgh Dock.

The principal difference between the two buildings is that in the new Warehouse no flat floors for the accommodation of grain are provided. In the Edinburgh Dock Warehouse about one-tenth of the whole capacity consists of flat floors, but it has been found from experience that these are of comparatively little use as compared with vertical silos, so that in the new

Warehouse at the Imperial Dock the whole of the accommodation consists of silos.

The new building, which is constructed entirely of reinforced concrete, is rectangular shaped, about 160 ft. long by 143 ft. wide, and its height to roof level is 150 ft. It comprises (1) a storage section consisting of a series of grain silos with a total capacity of 20,000 tons; and (2) a delivery section consisting of a series of grain delivery silos of a total capacity of 2,500 tons, together with six working floors for the necessary distributing, weighing and delivery of the grain.

The Storage section is provided with sixty-nine silos, each about 14 ft. by 12 ft. 6 ins., holding 1,000 quarters of grain, and sixty silos, each 14 ft. by 6 ft., holding 500 quarters of grain, all the bins being approximately 77 ft. high and fitted with hoppers of reinforced concrete.

The Delivery section consists of a series of twenty-five delivery silos, each holding 500 quarters of grain, with an elevator tower about 150 ft. high above the ground, the tower being provided with six floors to carry the elevating machinery, appliances and equipment for the handling and weighing of grain and the cleaning up of dust. The delivery silos are fitted with steel hopper bottoms, feeding to portable automatic sack-weighing machines on the delivery floor.

For delivery of grain in bulk to railway vans and road lorries, special trunking is provided direct from the large weighing machines to the ground level.

A passenger lift and stairway extends from the ground level to the top of the tower, serving all floors.

The roofs, which are flat, are of reinforced concrete covered with asphalt.

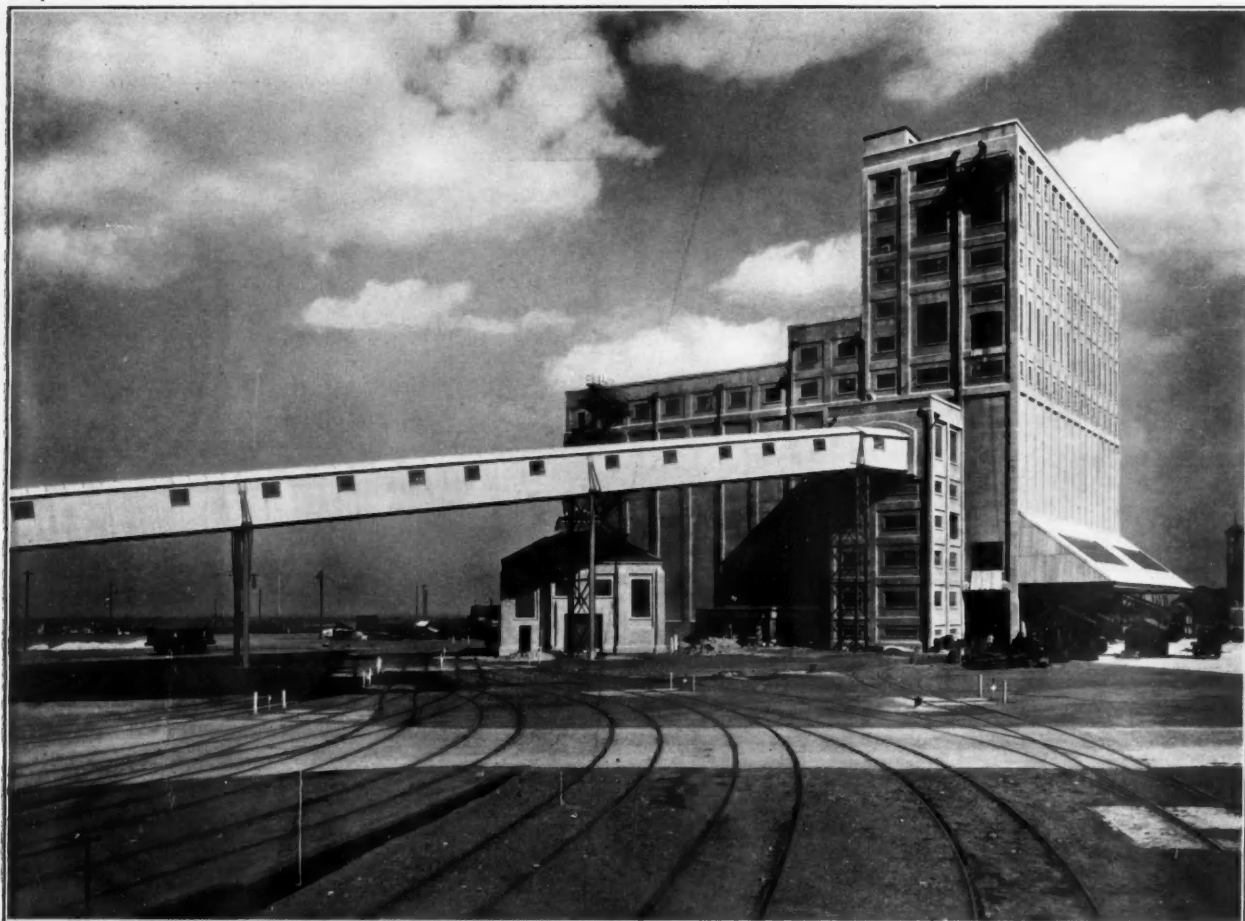
The whole of the reinforced concrete has been designed to comply with the latest fire resistance practice; and suitable fire service and fire escapes have been provided throughout the building.

Along the whole front of the Warehouse a verandah is fixed so that lorries and waggons can be loaded under cover.

The two pneumatic ship-discharging plants which serve the Warehouse are placed on the quay of the Imperial Dock at No. 6 Shed Berth. The plants are of the travelling type and can be placed at any point to suit the hatches of the grain ship to be discharged. Each plant is capable of discharging 180 tons of wheat per hour from a vessel lying alongside, and automatically delivers the grain to either of two conveyor belts placed in a gallery above the roof of the dock shed. Each plant has two 10-in. pipes for lowering into the hold of the vessel, the lower end being fitted with a nozzle and the upper end being connected to a large air canister with a special discharger from which the grain is delivered on to the conveyor belts in the gantry and taken to the Warehouse.

The pumps for the ship-discharging plants on the quay are placed in a pump house inside No. 6 Transit Shed at the Imperial Dock. Two sets of vacuum pumps are of the vertical double-acting reciprocating type arranged in double units and driven by electric motors through double helical gearing.

Port of Leith



The new Grain Warehouse in the Port of Leith.



View from top of new Grain Elevator, showing Gantry.

Port of Leith—continued

Two large air intake pipes extend from the pumps along the front of No. 6 Shed to which the travelling ship-discharging plants can be connected at intervals of about 18 ft.

The lifting of the grain from the ship is effected in the following manner:—After the discharging plant has been connected to the intake pipes along the front of the shed, the pumps are started and exhaust the air from the pipe system and the canisters of the discharging plants. The 10-in. pipes attached to the discharging plants are then lowered into the grain in the hold of the ship, and the rush of air through the nozzles carries the grain up the pipes and into the canister, from which it is discharged on to the conveyor belts in the gantry, which convey the grain to a weighing house which is alongside and immediately adjoining the Warehouse. The grain is then passed through one of the two automatic weighing machines, which are of two-ton capacity, and discharged on to the main 360-ton conveyor belts inside the Warehouse. From the main conveyors the grain passes to one of five bucket elevators which raise it to the top of the building. It is then passed, by means of chutes, to the nearer bins, or by conveyors to the further bins, and is delivered to the particular bin in which it is to be stored.

When it is desired to deliver grain out from the Warehouse to merchants, millers, etc., it is drawn off from the bottom of the storage bin on to a conveyor belt in a tunnel at the ground level and this delivers it to one of the bucket elevators, which takes it to the top of the tower. It is then passed through one of the five three-ton automatic weighing machines and discharged either through a delivery bin or direct through chutes to bulk waggons or bulk lorries on the ground.

If grain is required to be delivered in sacks it is drawn from the delivery bins and weighed by portable automatic weighing machines, sacked and delivered to railway waggons or lorries under the verandah.

Each storage bin is provided with an electrically-controlled Temperature Recorder, so arranged that the temperature of grain in any bin, at points every 10 ft. down the bin, can be indicated on a switchboard placed for this purpose on the distributing floor.

The whole of the motors and lighting of the building are controlled from an electric Switch House on the ground floor at the western side of the Warehouse. In this house is also placed a sequence board which makes it possible to arrange the electric motors driving the various conveyors and elevators

from ship to storage bin in the necessary sequence, so that in the event of any one of the machines, from any cause, breaking down or stopping, all the other machines in the same line immediately stop, thus preventing a stream of grain from being spilled and piled up at the point where the breakdown has occurred.

In order to supply the additional electric energy required for all this plant a new Electric Transformer House has been constructed adjacent to the Warehouse.

Electric energy is supplied by the Edinburgh Corporation from their Power Station at Portobello, in the form of alternating current at 6,600 volts.

E.H.T. electric cables are led from the Commissioners' Automatic Station at the Edinburgh Dock, where the High Tension Switchgear has been altered and extended for the purpose, and also from the transformer section of the new Hydraulic Station at the Imperial Dock, thus providing two sources of supply for the grain plant and Warehouse.

In the new Transformer House current will be transformed from 6,600 volts to 440 volts to supply electric energy to all the motors in the Warehouse, to those which drive the conveyor belts from the Imperial Dock, to the Pneumatic Pumping Station, and to the live rails along the front of No. 6 Shed to supply current to the discharging plants and to the four cranes now installed on the quay.

In order to deal with the immediate traffic of the new Warehouse a small branch office has been built adjoining the site. The existing office at the Edinburgh Dock will continue to be the Head Office of the Warehouse Manager and Staff.

The Superintendent and Engineer to the Commissioners, Mr. Alfred H. Roberts, O.B.E., M.Inst.C.E., has been responsible for the whole of the scheme; while the preparation of the designs of the Buildings, Machinery and Equipment, and the construction of the work was carried out under the direction of Mr. J. Dagleish Easton, M.Inst.C.E., the Chief Assistant Engineer, assisted by Mr. T. A. S. Fortune, A.M.Inst.C.E., who acted as Resident Engineer for the Building and Equipment, and Mr. Andrew Hay, G.I.E.E., who has supervised the electrical installation.

The Commissioners' Engineering Department constructed, by direct labour, the whole of the new railways and roads, together with the piled foundations for the Pump and Transformer Houses and the Travelling Pneumatic Structures on the Quay.

Lighting for Cranes

The second report in the series of papers on Industrial Lighting issued by the Department of Scientific and Industrial Research was published recently (Illumination Research Technical Paper No. 15 H.M. Stationery Office, 3d. net), and deals with lighting for cranes. The first report of the series which dealt with the lighting of docks, warehouses and their approaches, appeared a few months ago. The report points out that in crane lighting there are two mutually opposing points of view to be dealt with, namely, those of the crane driver, and the worker on the quay. Lights which the crane may carry to illuminate the load may be a source of glare to those working on the quay. Conversely, cluster and other lamps situated on the quay and directly visible to the crane driver may interfere with his vision. A system of crane lighting, therefore, should provide satisfactory visibility of the load in all positions; also, if possible, of the extremity of the jib, without glare to the driver or quay worker. On the quay the light sources should preferably be of low brightness, carefully positioned and invisible from the crane cabin.

Various experimental systems of lighting of cranes are considered in the report. In the first system the lighting consisted of a cluster of four 100-watt lamps in a shallow enamel reflector, rigidly fixed near the middle point of the jib, while a portable cluster of lights was used on the ground. With this system, glare from the cluster could be made inappreciable to the driver and small, though noticeable, to the worker below. It is pointed out that such a system gives general illumination from a point not altogether suitable for a man on the quay, and that, as the light is widely diffused, it results in inefficiency for a specialised operation, and does not throw the load into relief to any extent. A system in which the cluster on the jib was replaced by a 1,500-watt wide-angle fitting had the disadvantage of high power consumption, and gave troublesome glare to workers on the quay. The absence of light on the jib and the load in a hoisted position are also serious drawbacks, but on the other hand, the system gave a higher general illumination without glare to the driver.

A third system consisted of a set of four very narrow angle projectors with four 25-watt lamps at the corner of a square

frame at the upper extremity of the jib. This system gave fairly good illumination vertically downward on the load in practically all positions, and a spot of light on the quay not too sharply defined of about 10 ft. in diameter. It was lower in consumption and gave no glare whatever to any party. It did not, however, show up obstacles in the path of the jib or the load, and there was a possibility of damage to the frame and projectors by collision with masts or rigging which could be avoided by providing an extra lighting point enabling the driver to see the jib head. The report remarks that the clear shadow of the load caused by this system is a useful warning of its proximity, and is a guide to the driver while hoisting his load.

Immingham Dock Statistics.

During the month of April, 1934, a total of 95 vessels, representing a net registered tonnage of 119,784, used Immingham Dock, including 15 vessels totalling 13,077 net registered tons, using the Western Jetty coaling berth; as compared with April, 1933, when 76 vessels totalling 97,920 net registered tons used the port, including nine vessels of 11,538 net registered tons using the Western Jetty.

Canada's External Trade: Last Quarter of 1933.

The Dominion Bureau of Statistics at Ottawa has forwarded to the Reference Library, Canada House, Trafalgar Square, London, S.W.1, its Quarterly Report on the Trade of Canada for December, 1933, covering the months of October, November and December, and the nine months ended December 31st, 1932 and 1933.

From this booklet it appears that imports for consumption during the nine months dropped from \$325,465,459 in 1932 to \$320,336,026 last year, whilst exports of Canadian products rose from \$379,261,780 to \$436,936,004. Imports from the United Kingdom rose from \$68,261,932 to \$79,862,951, and exports from \$147,307,029 to \$173,360,341.

Near Eastern Port Matters

SHIPPING at Greek ports during the period from January 1st to December 31st, 1933, included the arrival of 3,121 ships, representing 5,371,538 n.r.t., against 2,983 ships, representing 5,104,066 n.r.t., during the corresponding period of 1932, and the clearance of 2,609 ships, representing 4,498,188 n.r.t., against 2,359 ships and 4,192,255 n.r.t. Shipping has considerably improved, thanks to the better economic condition of the country. In order to obtain an idea of the position of the various countries in Greek shipping, it may be interesting to consider the following figures:—

	ARRIVALS				CLEARANCES			
	No.	1933 N.R.T.	No.	1932 N.R.T.	No.	1933 N.R.T.	No.	1932 N.R.T.
America...	24	89,623	29	101,097	39	136,056	34	124,000
Britain...	167	359,395	207	392,126	153	264,671	169	228,374
Holland...	43	74,756	59	89,970	52	62,561	53	61,646
France...	89	263,887	120	407,998	75	267,351	111	404,829
Germany...	95	163,787	79	128,779	95	138,782	83	144,792
Greece...	973	939,593	823	839,702	548	439,167	383	355,536
Italy...	1,034	2,452,900	999	2,217,175	977	2,182,546	933	1,973,637
Roumania...	158	231,157	137	170,814	161	237,930	127	160,473

As far as arrivals are concerned, only Germany, Greece, Italy and Roumania have shown increases in shipping at Greek ports. With the exception of France and Germany, all other countries trading in Greek waters have shown considerable increases in clearances. There has also been an increase in trade by Bulgaria and Turkey, chiefly due to the creation of a joint Turco-Bulgarian steamship service between the Black Sea, Pireaus and Marseilles. In connection with shipping at Greek ports, it may be added that the Greek Government is planning to increase port charges in order to secure appropriate funds to carry out harbour enlargements.

The Port of Pireaus still retains the premier position among Greek ports, and the arrivals at Pireaus, during the whole of 1933, included 1,764 ships, representing 3,607,522 n.r.t., against 1,720 ships and 3,438,425 n.r.t., during the corresponding period of 1932, and the clearances of 1,169 ships, representing 2,394,188 n.r.t., against 1,190 ships and 2,420,391 n.r.t. There has been an improvement in connection with arrivals, but a slight decrease in departures, and this fact is due to the depression which has been noted in shipping at Pireaus during the last two months of 1933. The increase in arrivals is due to a larger number of vessels calling from Egypt and Italy, while the chief feature in departures is represented by smaller clearances from Greece to France. The position of the various countries in shipping at Pireaus, during 1933, is shown in the following figures:—

	ARRIVALS				CLEARANCES			
	No.	1933 N.R.T.	No.	1932 N.R.T.	No.	1933 N.R.T.	No.	1932 N.R.T.
PIREAEUS	23	88,135	29	101,097	5	17,049	5	17,442
America...	99	232,560	131	276,003	26	72,401	41	55,938
Britain...	18	41,996	33	63,273	7	9,717	3	4,725
Holland...	74	245,923	110	400,377	71	245,101	109	401,974
France...	56	96,832	47	65,714	14	24,185	15	21,437
Germany...	491	620,254	433	547,925	235	261,498	215	225,258
Greece...	608	1,505,744	553	1,268,586	459	1,099,052	477	1,053,358
Italy...	127	207,817	118	158,752	121	203,020	105	141,405
Roumania...								

The progress of Holland in departures from Greece is due to a larger activity of the regular Dutch lines from the Levant to North Sea German ports. The efforts made by the Greek Government to attract shipping to the Pireaus Free Zone have practically failed owing to the difficulties encountered in organising labour on a sound basis.

The Port of Patras follows Pireaus, in order of importance, and, according to the statistics which have been published by the Statistique Générale de la Grèce of the Ministry of National Economy, shipping at that port, during the twelve months of 1933, included the arrival of 208 ships, representing 559,362 n.r.t., against 225 ships and 522,508 n.r.t. during the corresponding period of 1932, and the clearance of 179 ships and 622,939 n.r.t., against 124 ships and 439,714 n.r.t. Shipping at Patras has shown an increase, particularly as far as clearances are concerned, due mainly to a larger number of departures to Italy, while departures to American ports have shown a decrease. The position of the various countries in shipping at Patras is shown in the following figures:—

	ARRIVALS				CLEARANCES			
	No.	1933 N.R.T.	No.	1932 N.R.T.	No.	1933 N.R.T.	No.	1932 N.R.T.
PATRAS	20	27,516	24	36,853	27	33,391	31	40,556
America...	13	19,229	10	10,359	8	9,986	11	13,510
Britain...								
Holland...								
France...								
Germany...	11	12,392	14	17,128	14	17,040	12	14,776
Greece...	32	32,066	23	14,803	4	6,349	5	17,911
Italy...	99	430,985	89	397,343	111	535,887	54	328,444
Roumania...	1	784	—	—	—	—	—	—

As far as arrivals are concerned, there has been a considerable increase in traffic from Holland and Italy, while with reference to departures there has been an improvement in regard to Italy and Germany.

At the Port of Salonika, the Free Zone Administration, which is in charge of the port, is considering the possibility of commencing harbour enlargements, as it has been realised that without an increase of quayage it would be impossible to attract more transit trade to Salonika. Shipping at Salonika, during 1933, included the arrival of 116 ships, representing 152,772 n.r.t., against 166 ships and 231,135 n.r.t. during the corresponding period of 1932, and the clearance of 173 ships and 265,838 n.r.t., against 172 ships and 293,080 n.r.t., thus showing a further decrease in respect to previous years, due above all to smaller imports of oil from Roumania and of general cargo from North Europe. There has been, instead, an improvement in shipments of tobacco from Salonika to Germany, Great Britain, etc. The position of the various countries in shipping at Salonika is as follows:—

	ARRIVALS				CLEARANCES			
	No.	1933 N.R.T.	No.	1932 N.R.T.	No.	1933 N.R.T.	No.	1932 N.R.T.
SALONIKA	21	32,572	18	31,637	26	39,919	26	39,215
America...	4	4,124	5	5,155	5	7,079	3	4,426
Britain...	4	2,204	2	853	—	—	—	—
Holland...	2	2,023	4	7,914	4	6,700	3	5,572
France...	19	37,073	51	70,176	11	25,145	13	25,764
Germany...	2	5,928	29	59,224	3	5,572	6	9,232
Greece...	22	15,896	18	10,670	26	20,721	11	9,106
Italy...								
Roumania...								

Italy took first place in arrivals at Salonika during 1932, but has dropped to third place during 1933, while the first place is occupied by Great Britain. In the departures from Salonika there has been a noteworthy improvement, both by America and Roumania.

The position of shipping at other Greek ports during 1933 may be summarized as follows:—

	ARRIVALS				CLEARANCES			
	No.	1933 N.R.T.	No.	1932 N.R.T.	No.	1933 N.R.T.	No.	1932 N.R.T.
Volos...	17	25,553	36	41,472	40	44,188	19	21,430
Heracleion	138	124,493	87	63,175	222	155,930	131	96,658
Cavalla...	40	71,196	33	46,722	20	30,370	13	18,995
Calamata	48	46,575	41	45,270	115	118,883	95	94,293
Mytilene	122	92,763	120	78,524	73	102,848	79	103,692

There has been a considerable improvement in shipping at Heracleion, Cavalla and Calamata, and it is stated that this is the result of improved harbour facilities at these ports. It is stated that the Harbour Committee at Cavalla is now seriously considering the possibility of building some concrete warehouses to store tobacco ready for shipment.

Much interest is being shown in Alexandria regarding the progress of shipping at Haifa and at Syrian ports, and it has been suggested that the Egyptian Government should withdraw the credits which have been allotted for the enlargement of the Port of Alexandria, and that for the present only the most urgent works should be carried out. It has also been suggested that the greatest attention should be paid to the construction of warehouses and to the dredging works at Alexandria.

Record Shipments of British Cars to New Zealand.

British motor-cars, which in recent months have been exported in record quantities to New Zealand, are now being shipped across 11,000 miles of ocean without packing. The huge wooden cases, which have been a familiar sight at the docks for the last twenty years, are on the way to extinction.

On Thursday, May 3rd, a cargo of 105 cars was shipped from King George V. Dock by the steamer "Ruahine." They were brought to the dockside by rail, placed on the wharf, and one by one lifted with specially padded gear by huge cranes, and dropped straight into the hold of the vessel. The new system of handling cars for export has been made possible by improved stowage and special handling gear, and is said to have practically eliminated the manufacturers' packing costs and the agents' re-assembling charges on the other side.

Largely as a result of the Ottawa preferences, Britain's share in New Zealand's imports of cars has risen from 19 per cent. in 1929 to 90 per cent. to-day. The United Kingdom has, in fact, wrested a virtual monopoly of the Dominion motor-market from the United States within the last four years.

This year British motor shipments to New Zealand have broken all records. During the first three months of 1934, the United Kingdom exported 1,542 cars to the Dominion, compared with 616 during the same period last year. As many as 200 vehicles have been shipped to New Zealand by one vessel.

Notes from the North

Tunnel Ventilating Station.

MERSEY Tunnel Joint Committee has decided to create storage accommodation on the tunnel level at a point adjoining the George's Dock ventilating station, Liverpool, by making use of a clearance, which was intended originally for the ventilation station foundations, but was not so utilised owing to a change in the plans. The space will now be used for the storage of spare parts and engineering equipment. It covers an area of between 300 and 400 sq. yds., and its development for storage purposes will cost about £7,000.

Mersey Foreshore.

To save the sandhills at Crosby on the river Mersey from the attacks of the sea, forty tons of tin slag a day have been deposited along the Burbo Bank Road, but this experiment, though partially effective, has not removed the threat to property along the coast. The problem has become more acute after each gale, and questions have been raised in Parliament.

About 20,000 tons of tin slag will be needed for a revetment, which it is proposed to build, and will employ about thirty men. When the barrier is built the Alt will have its outlet into the Mersey at a point between Hightown and Hall Road. The cost is estimated at about £6,000. Several schemes have been considered to divert the river Alt, including the blasting of a new channel out to sea, but this had to be abandoned owing to the cost.

Rat Prevention in Dock Areas.

Special precautions are taken in the port of Liverpool, particularly in the dock area, to prevent the passage of rats between ship and shore. This is necessary, as Liverpool trades extensively with many foreign ports where plague is always present. All vessels, with the exception of coastwise vessels, must have rat-guards fixed to their moorings during their stay in port. The rat-guard used and approved of by the Port Sanitary Authority consists of a disc of galvanised sheet iron, 1/16th in. thick and 3 ft. in diameter. The edge is left raw, i.e., not wired or turned over. In the lower half is cut a door, hinged and so fastened when shut that no foothold is afforded to rats. The door slit leads to the central hole through which the rope passes. Round the central hole is placed a strong collar projecting about 4 ins. on each side and riveted to the disc. In the collar is a strong steel clip, which can be adjusted by means of a winged nut and bolt. To apply the guard, the door is opened and the guard put over the rope so that the latter passes up into the central hole, where a little force is necessary to overcome the spring of the clip. The guard will now hold quite firmly, and the bolt and screw closing the opening of the clip gives additional security. The door is then closed and fastened, the upper edge being fitted with a piece of thick sheet rubber attached so as to close completely the central hole, whatever the size of rope in use.

With the exception of a few of the old docks on the central district, the wharves on the dock estate are of rat-proof construction, made with ferro-concrete and stone. The roadways and pavings of the sheds are sets on a concrete foundation. The sheds are built of brick and reinforced concrete. All sheds in the new Gladstone Dock are constructed solely of reinforced concrete, and there are no ledges, beams or angle iron on which rats may run. All offices and wooden huts in the sheds are made rat-proof, either by being lifted 18 ins. clear of the ground or sheathed with iron or cemented round the base. New offices or other buildings are either built on brick or concrete piers clear of the ground or the base is built hard and close to the pavings of the shed.

The Mersey Docks and Harbour Board and the various shipping companies are fully alive to the necessity and benefit of rat-proofing, and practically all sheds, huts, offices and warehouses on the dock estate have now been made rat-proof. Constant supervision is required, however, in the case of stores, otherwise they tend to become harbourages for rats. It is the duty of the sanitary inspectors to see that all stores are kept clean and tidy, and that no rubbish is allowed to accumulate. Old rope, dunnage, wood, etc., must be stacked neatly on platforms raised 18 ins. from the ground, and the space beneath the platform must be kept clean and free from rubbish.

Lack of Accommodation at Landing Stage.

The Transport Committee of the Liverpool Chamber of Commerce has had under consideration the lack of accommodation at the Customs Examination Sheds at the Liverpool Landing Stage. It was suggested that the Riverside Station is too near the water's edge, and also that it should be possible to make better arrangements. It was reported that the communication had been referred to the Dock Board for observation, and that the Board had replied that the particular instance would be enquired into and a report made.

Ribble Dock Progress.

An excellent report of the state of trade at the Ribble Dock during the year ended 31st March, was presented to the Preston Town Council. The net tonnage of vessels using the port was 583,112, and the imports totalled 751,784 tons, which was a record. All the principal traffic shows an increase, and the jump in the import of motor spirit of 205,718 tons is the largest experienced in one year. Exports showed a decrease of 10,000 tons, which was due entirely to the situation between this country and the Irish Free State, and yet imports of Irish cattle had increased. The year's revenue figures showed an increase of £23,320.

Ribble Waterway Traffic returns give the following particulars for March:—115 vessels, with a registered tonnage of 42,128; imports, 41,799 tons; exports, 15,842 tons; revenue, £13,670. The figures for March of last year were:—120 vessels, with a registered tonnage of 46,449; imports, 48,365 tons; exports, 15,335 tons; revenue, £15,884. For the twelve months ended March last, the returns were:—1,395 vessels, with a registered tonnage of 583,112; imports, 751,784 tons; exports, 176,100 tons; revenue, £224,146. Compared with the following for the previous year:—1,401 vessels, with a registered tonnage of 549,788; imports, 656,876 tons; exports, 186,911 tons; revenue, £200,826.

Ship Canal Traffic Rise.

Another increase in Manchester Ship Canal traffic is reported. The receipts from the main waterway in April were £100,013, compared with £96,712 in the previous month. For the four months' period (January-April) there is an increase of £14,297, as compared with 1933, one of £10,210, as compared with 1932, and one of £7,485, as compared with 1931; as compared with 1930, there is a fall of some £40,000.

Vehicles in Port Areas.

In its annual report, the Transport Committee of the Liverpool Chamber of Commerce states "it still holds the view that, either from a misconception of the true position, to dispel which every effort has been made, or by reason of a want of equity, the vehicular traffic within the port is being called upon to contribute a higher rate of taxation than circumstances warrant, and that the transport services of the port are in consequence improperly embarrassed. Arrangements are continuing to submit further representations with a view to correcting the position, or at least to secure the avoidance of any interference with the adaptations made to meet the new taxation."

Bromborough Dock.

At the 40th annual general meeting of the shareholders of Lever Bros., Ltd., at Port Sunlight, Mr. F. G. D'Arcy stated that further use had been made of Bromborough Dock. The total tonnage handled inwards and outwards was increased by 61,739 tons. The facilities of the dock had been improved by the installation of silos for the storage of copra and palm kernels, and the direct handling of these commodities from ship to store had given appreciable economies. Again, he could record substantial savings in transport and distribution. The co-ordination of the transport of all companies within the organisation had been further developed, resulting not only in economy but in increased efficiency. It was the general policy of the company in co-ordinating its transport arrangements to pay particular regard to the national transport interests, and, to this end, great care was taken (1) to select the most suitable form of transport for each movement, and (2) to eliminate redundant transport.

Members of Institute of Transport Visit Bromborough Dock.

Members of the Manchester and Liverpool Section of the Institute of Transport recently made a tour of inspection of Bromborough Dock and the soap works of Messrs. Lever Bros., at Port Sunlight. The visitors, who were entertained to luncheon by the firm, were welcomed, on behalf of the Directors, by Mr. E. Clement Davies, K.C., M.P. In his speech he referred to the importance of transport in present-day industry—it was the link between the producer and the consumer—and he thought that many of the difficulties of the economic world could be solved by its better appreciation. Mr. J. G. Merriweather, of the Ribble Navigation, Chairman of the Section, mentioning that chairmen of the Birmingham, Bristol and Scottish Sections were also present, called upon Mr. C. Le M. Gosselin, a vice-president of the Institute and a past-chairman of the Section, to reply.

Dock Charges on UMBER.

The Mersey Docks and Harbour Board have directed that umber, in bags, be added to the list of articles on which an extra charge of one penny per ton for every sixpence per day for labour is added to the Quay Delivery Rates shown in the classification tables.

Aden Port Trust

The following are the returns for the month of March, 1934, of shipping using the port:—

	No.	Tonnage
Merchant Vessels over 200 tons ...	143	634,527
" " under 200 tons ...	3	323
Government Vessels ...	12	38,085
Dhows ...	134	4,604
PERIM.		
Merchant Vessels over 200 tons ...	26	72,055

The total value of imports, excluding Government Stores, was Rs.43,08,000/-, as compared with Rs.47,94,000/- for March, 1933, and of exports Rs.35,56,000/-, as compared with Rs. 30,81,000/-.

The total value of both imports and exports together was Rs.78,64,000/-, as compared with Rs.78,75,000/- for the corresponding month last year.

Imports during the month were above those for March, 1933, in the case of gums and resins, hardware, raw skins, sugar, grey, white and printed or dyed piece goods, twist and yarn;

TRADE OF THE PORT.

Article.	Unit	Imports.		Exports	
		Quantity.	Value Rs.	Quantity.	Value Rs.
Coal ...	Tons	0	0	0	0
Coffee ...	Cwts.	8,312	2,25,116	9,993	3,47,017
Grain, Pulse and Flour ...	"	69,870	3,21,237	50,583	2,13,578
Gums and Resins ...	"	5,121	76,045	5,462	1,29,536
Hardware ...	"	0	28,554	0	20,291
Hides, raw ...	No.	100	120	5,801	7,523
Oil, Fuel ...	Tons	35,349	8,83,725	0	0
" Kerosene ...	Gls.	19,109	13,054	4,988	3,329
" Petrol ...	"	16,501	19,113	5,528	6,589
Salt ...	Tons	0	0	32,500	3,25,000
Seeds ...	Cwts.	2,116	18,151	710	7,136
Skins, raw ...	No.	532,110	2,59,477	945,478	7,82,337
Sugar ...	Cwts.	24,826	1,27,686	24,578	1,26,569
Textiles—					
Piece Goods, Grey ...	Yds.	4,388,510	5,54,940	3,583,350	4,63,091
" " White ...	"	620,767	92,411	293,665	52,977
" " Printed or Dyed ...	"	1,185,996	2,15,004	1,138,379	2,41,388
Twist and Yarn ...	Lbs.	210,960	98,885	236,168	1,08,805
Tobacco, Unmanufactured ...	"	529,144	1,02,144	279,026	56,879
" Manufactured ...	"	90,707	50,447	22,957	18,264
Other Articles ...	No. of Pkges.	71,524	10,95,542	23,530	4,51,691
Treasure, Private ...	—	0	1,26,361	0	1,93,785
Total ...	—	—	43,08,012	—	35,55,735

The number of merchant vessels over 200 tons that used the port in March, 1934, was 143, as compared with 121 in the corresponding month last year, and the total tonnage was 635,000, as compared with 523,000.

Excluding coal, salt, fuel oil and Military and Naval stores and transshipment cargo, the total tonnage of imports in the month was 11,400, and of exports 7,600, as compared with 10,600 and 6,700 respectively for the corresponding month last year.

and below in the case of coffee, grain, pulse and flour, raw hides, seeds, unmanufactured and manufactured tobacco, and private treasure.

Exports were above those for March, 1933, in the case of coffee, grain, pulse and flour, gums and resins, raw hides, raw skins, sugar, twist and yarn; and below in the case of hardware, seeds, grey, white and printed or dyed piece goods, unmanufactured and manufactured tobacco, and private treasure.

Irish Harbour Matters

£15,000,000 for Shipping Companies.

The Northern Ireland Government, according to a White Paper, has guaranteed loans to the extent of £15,118,307, which have been obtained by shipping companies from banks and other institutions to enable them to order new ships from the Belfast shipyards. By reason of the Government guarantee, these shipping companies are able to obtain loans at a lower rate of interest. The shipping companies have repaid £4,015,669, so that the total amount of the loans guaranteed outstanding on March 31st was £11,102,638. Recent loans which have been guaranteed are—£810,000 to the Blue Star Line, which has two vessels under construction at Messrs. Harland and Wolff's Belfast yard, and £1,700,000 for the Union Castle Line, which placed orders with the same firm for four ships; two large passenger liners for the South African passenger service, and two cargo vessels of considerable tonnage.

These loans are for a period of ten and twelve years.

Members of Parliament at Westminster have complained that their loan guarantees are a form of indirect subsidy to the Belfast shipbuilding industry, as the loan guarantee arrangement has been continued in Northern Ireland, while it has been discontinued at Westminster. No subsidy, however, is paid to Belfast shipbuilding firms, who must tender for all work on a competitive basis.

Dundalk Harbour Board.

At the annual meeting of the Dundalk Harbour Commissioners, Mr. T. F. McGahon, outgoing Chairman, was re-elected; Mr. P. Deery was re-elected Vice-Chairman.

The Auditors' report and statement of accounts, which were adopted, stated that the revenue derived from all sources during 1933 was £12,230 14s. 4d., while the expenditure amounted to £11,547 14s. 8d., thus leaving a surplus of

£682 19s. 8d.; compared with the previous year revenue showed a decline of approximately £1,196, occurring mainly under the following heads:—Cargo, £423; Tonnage, £290; Cranage, £234; Quayage, £223.

The expenditure also was reduced by approximately £1,468, as compared with 1932, the principal variations being as follows:—

Decreases: Dredger, £467; Tug-boat, £296; Barges and Grab Crane, £165; Pontoon, £315; Cranage, £243; Income Tax, £322.

Increases: Repairs to Berths, £125; Repairs to Quays, £289; Embankment Repairs and Maintenance, £117.

The aggregate wages disbursed during the year was £4,097 19s. 8d., of which £190 16s. 10d. represented the value of overtime worked.

The financial position as at 31st December, 1933, had not improved—the overdraft on General Account being £3,274 1s. 7d., as compared with £3,056 8s. 6d. in the previous year. Capital indebtedness on the Loan Accounts was reduced during the year by £850.

The Chairman, in moving the adoption of the report and statement of accounts, said they were not unsatisfactory. Undoubtedly their income was down by £1,196, but their expenditure had been kept down to a corresponding figure. Their loss of income was largely due to the fact that imports of coal were down by almost 20,000 tons, their total being 103,000 tons, as against 122,000 tons in 1932.

There was a time when half the revenue of the Harbour Board was derived from the Dundalk and Newry Steam Packet Company's sailings, when that Company were able to keep three steamers and make four sailings a week between Dundalk and Liverpool. Now they had not more than one sailing weekly, and the revenue had fallen to £1,282 in 1933.

For the month of April last it was announced that the receipts were £1,229 and the payments £554.

While 948 cattle and 300 sheep were exported from Dundalk in April, 1933, not a single beast was shipped in April of this year.

Why

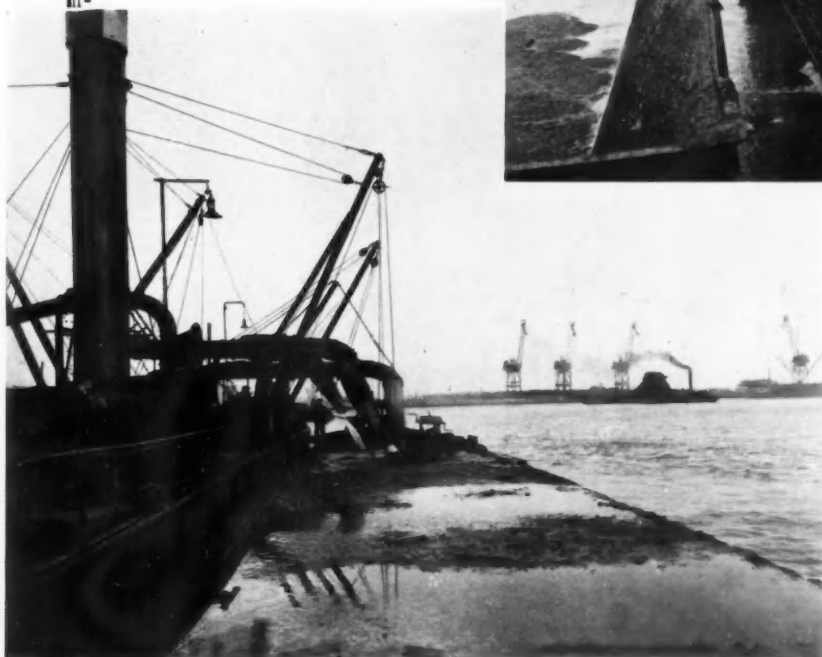
dump rich spoil into the sea if it can be dredged and pumped ashore direct, or from Barges, upon waste lands AT LESS EXPENSE?

Port of Bromborough Dredging & Reclamation Contract

1. Loading the Reclamation Barges



2. Barge load of spoil alongside Reclamation Dredger



3. Pumping spoil



WESTMINSTER DREDGING COMPANY LTD.
32, VICTORIA STREET, WESTMINSTER, LONDON, S.W. 1

Telephone—Victoria 9894
Telegrams—Dredgeria, Sowest, London

Cables—Dredgeria, London
Code—A.B.C. 5th Edition

SI PREGA FAR MENZIONE DEL "DOCK AND HARBOUR AUTHORITY" QUANDO SCRIVETE.

Book Review

CONCRETE STRUCTURES IN MARINE WORK, by R. Stroyer, B.Sc., M.Inst.C.E., M.I.Mech.E., M.Ing.F., London—Knapp, Drewett and Sons, Ltd. 15s. net.

IN this interesting and informative little book of just over 200 pages, the Author treats of concrete, retaining walls, piles, wharves, piers and breakwaters, marine foundations, and last but not least, he devotes an entire chapter to "Practical Hints."

The above list is fairly comprehensive, the examples instanced are more so, while the illustrations, which consist of drawings and photographic reproductions exceed the pages in number.

An important feature of the book is the appendix, which is a translation into English of a publication issued by the Danish Society of Engineers and called "Preliminary regulations for the calculation and execution of Marine Structures in reinforced concrete." Further reference is made to this when dealing with the chapter on retaining walls.

In his preface the author modestly describes the book as a collection of notes. He leaves the reviewer to add that the "notes" are skilfully woven into a melodious whole, making it a most readable book.

Tables and graphs prepared by the author will no doubt prove very useful to the engineer and designer, while his theories on earth pressure on retaining walls will be read with special interest.

The book begins with a brief survey of various building materials used in marine works, and the author's views on the value of concrete can best be given by quoting his own words.

"Concrete, plain or reinforced, is an ideal material for marine structures if it is properly made; if not, any other material is preferable, inasmuch as the possible harm which may then arise from its use reflects discredit on a material that has done, and will do, much service to the world at large."

In support of this, it is pointed out that concrete for marine work should be made as dense as possible in order to avoid deterioration from the chemical effects of sea water. To this end the author urges the necessity of a mix no weaker than 1 to 3 or 1 to 4, also frequent tests of the concrete, which should show a minimum crushing strength of 5,000 lbs. per square inch (four months for ordinary Portland cement and twenty-eight days for rapid hardening Portland cement).

It is doubtful whether such desirable results are economically possible on the actual work, but engineers will agree to the advisability of aiming at as high a standard as is attainable.

The chapter on retaining walls begins with a survey of the forces acting on a wall. Earth pressure is dealt with, and two tables are given, which show the "liquidity factor" of various soils.

The author then proceeds to discuss the extent to which a slight movement of the wall may influence the pressure against it.

For some years it has been known that calculations of the strength and stability of retaining walls embodied an unexplained high factor of safety, and experience justified an allowance being made for this latent factor. Scantlings of timber sheeting successfully held back earth which, theoretically, should produce breaking stresses resulting in failure.

The author states that in a number of cases which came under his observation, the calculated stresses reached and even exceeded the ultimate stress for the material in question, and yet the walls stood the pressure and appeared to be safe.

In an endeavour to explain this problem, the author develops the theory of arching action in the earth backing to a wall, and reprints part of a paper read by him before the Institution of Civil Engineers (1) on earth pressure on flexible walls.

Briefly stated, the theory is this: The full theoretical pressure causes a slight movement or flexure of the retaining wall. When this occurs, the backing does not act as a true fluid which would follow the wall with a maintained pressure, but forms an arch in itself, thus relieving the pressure on a portion of the wall and concentrating it at points approximating to the ends or springings of the arch.

This theory is fully explained and investigated by the author, who suggests a formula for calculating the reduced pressure. He admits the lack of experimental proofs, and invites any information bearing on this important subject.

In the Regulations for Marine Work, issued by the Danish Society of Engineers and which forms an appendix to this book, a method is given for calculating earth pressure by a formula which takes into account this theory of arching action.

The book next deals with typical cases of reinforced concrete walls, calculations being given for 1, a gravity wall; 2, a piled wall; and 3, an anchored wall.

The carrying capacity of piles is next dealt with, and the method of calculation suggested by the late Professor Krey is advocated as giving results more in accordance with facts than those obtained from other pile-driving formulas.

Methods of reinforcing soft soils by means of a mattress of gravel or sand, are described and illustrated.

A long chapter is devoted to wharves, which are considered under two headings, gravity wharves and piled structures.

Gravity wharves comprise those built of concrete blocks, reinforced concrete caissons, cylinders and monoliths. Numerous cross-sectional drawings of actual wharves add interest to the description of these various types, and from the many photographic illustrations those showing the launching and towing of reinforced concrete caissons may be selected as of great interest.

In the case of piled wharves, the straightforward sheet pile wall with anchor ties is first described. Then we get the combination of decking supported on piles with short sheeting piles at the back, and this is followed by various types of the platform or shelf wall with front sheeters and back supporting piles.

The author has the credit of introducing this type of wharf wall into this country. It is a type with which readers of this journal will be familiar, as a descriptive article about it appeared in a recent issue (2).

Another type of sheeting wall is also described. This is formed by driving king piles at even distances apart and fixing pre-cast reinforced concrete slab panels between the piles.

Numerous examples of all the above types are given, and the whole chapter is well supplied with illustrations.

The next subject dealt with in the book—Piers and Breakwaters—gives us, so to speak, our first real whiff of the sea! The two words "wave action" suggest the sometimes terrific forces which these structures have to withstand.

The author points out that, in the case of monolithic piers and breakwaters, built of concrete blocks, reinforced concrete caissons or heavy cylinders, forces arising from wave action of the sea are the most serious ones to be considered, whereas in the case of a piled pier or similar structure, it is the impact from the berthing of ships that is likely to cause most damage.

Many interesting examples of monolithic breakwaters are given, and form a useful collection of types designed to meet varying circumstances.

A system of timber fendering on the face of a piled structure, acts as a partial shock absorber of a berthing vessel's kinetic energy, but only to a certain extent, the balance having to be taken by the structure itself, which tends to suffer deformation in consequence.

Designs suitable for resisting any such bending or yield are described and illustrated by drawings of actual examples.

Marine foundations, other than those referred to above, include foundations for beacons, lighthouses, bridge piers and abutments.

Some very interesting photographs are reproduced showing the launching and floating of caisson foundations of bridge piers.

The large caissons required for the pier foundations of a bridge built by the Danish State Railways over the Little Belt, had to be built and launched upside down, as they drew too much water in their normal position. After being towed to deep water they were turned right side up by a system of one-sided ballasting with water and gravel. This interesting operation is fully described and illustrated by diagrams and photographs.

Very little is said about docks, but locks are described, and in particular Economiser Locks, which are in use on canals where the water supply is limited. These are fully described and their use explained by diagrams.

In his practical hints the author again lays stress upon the importance of securing good concrete, and explains a simple method of testing concrete by means of a home-made test bench. He is also very keen on the slump test, and rightly so, although his advocacy of testing every batch of concrete mixed may elicit comments from the makers of those concrete mixers, which are fitted with automatic water feed. The remainder of this chapter contains useful notes on cofferdams and temporary staging, pile making and driving.

As may be gathered from the outline given above, this book will well repay study by engineering students, and may be commended to all engineers interested in dock and harbour construction and similar marine works as a useful and attractive addition to their books of reference.

W. A. LINSKILL.

(1) Proc. Inst. C.E., Vol. 226.

(2) "The Dock and Harbour Authority," July, 1933.

Hull and the East Coast

Annual Meeting of the Humber Conservancy Commissioners.

AT the 26th Annual Meeting of the Humber Conservancy Commissioners the Chairman (Mr. J. H. Fisher, J.P.), reviewing the events of the twelve months, recalled that the Aire and Calder Navigation introduced into Parliament last autumn a Bill under which they applied for an extension of time until the end of 1937, in which to complete the training walls at Trent Falls. The Bill led to lengthy negotiations between its Sponsors and the Conservancy Board, which resulted in the latter consenting to contribute an additional fixed sum of £40,000 when the works are completed, making, in all, £116,000. The Royal Assent had been given, and he hoped that the good progress which was being made with the work would result in its early and successful completion. Reference was also made to the steps taken by the Hull Corporation to promote, under the Public Works Facilities' Act, 1930, a scheme for a floating landing stage at the Victoria Pier in the Humber at Hull, in connection with improvements in the ferry service between Hull and New Holland, undertaken by the London and North-Eastern Railway. Mr. Fisher said that the Board had approved the scheme, subject to the introduction into it of the requisite provisions for safeguarding the interests of the Board and Navigation. He added that he was informed that the Hull Corporation were still engaged in discussing the details, and that doubtless the Board would soon hear officially that further steps were being taken with regard to its promotion. Mr. Fisher also commented on the fact already reported in *The Dock and Harbour Authority*, that for the first time a navigable channel in the Humber had been marked out South of the Hull Middle Sand for use by vessels navigating from above Hull to the sea and *vice versa*, and that two days later a new channel was marked out on the Lincolnshire side between Whitton and Chalderness. These two new channels, he added, altered the ships' course between Trent Falls and Saltend, and from the Yorkshire to the Lincolnshire side of the river. In connection with the Godwin Battery (Kilnsea) artillery practice by-laws, he expressed satisfaction that the War Office had accepted the modifications suggested by the Board in the "sea area" at the mouth of the Humber, and intimated that it was not anticipated that more than seven days' firing would be carried on in any one year.

The Chairman, after referring to the accounts, concluded with an expression of appreciation of the assistance of the Deputy-Chairman and the staff, including the Solicitor, the Engineer and the Secretary.

Mr. Fisher was re-elected Chairman, on the proposition of Sir Hickman B. Bacon, Bart., seconded by Commander W. B. Clementson, and Mr. J. Bentley Bennett was re-appointed Deputy-Chairman on the motion of Mr. Fisher, seconded by Mr. E. P. Hutchinson.

It is of interest to add that Mr. A. W. Franklin, Secretary to the Humber Conservancy Board, who was specially referred to by the Chairman, has held that position practically since its inception. Mr. Franklin's previous experience was with the Thames Conservancy, now the Port of London Authority, his service extending over a period of 13½ years as private secretary to the late Sir Frederick Dixon-Hartland, Bart., M.P., and as Committee Clerk. On going to Hull, 26 years ago, he took over the duties of secretary to an authority whose work had previously been carried out by the Humber Pilotage Commission and the Hull Trinity House. At the time of Mr. Franklin's appointment, it was commented that he was the youngest chief administrative port official in the country. By reason of his long service with the Humber Conservancy he is now, in all probability, the senior administrative port official in the United Kingdom holding office of this nature.

Objection to By-laws Proposed by Trent Catchment Board.

The Works and Marine Committees of the Humber Conservancy have had under consideration certain by-laws which the Trent Catchment Board have asked the Ministry of Agriculture and Fisheries to confirm. The object of the by-laws is to secure the efficient working of the drainage system in the Trent area, including the Lower Trent over which the Humber Conservancy exercise jurisdiction for navigational purposes. As these by-laws as at present proposed conflict in several respects with the statutory powers and duties of the Conservancy Board, the latter have therefore offered serious objection and are urging that the by-laws should not apply to the Lower Trent.

Alterations to Humber Pilotage Dues Proposed.

A new development in connection with Humber pilotage is in prospect as an outcome of proposals which have been put forward to alter the incidence of pilotage dues. The proposals which, if adopted, would involve legislation to amend the existing Act of 1913, are as follow: To require every ship (with certain exceptions to be agreed later) entering or leaving a

port, whether piloted or not, to make a contribution to the fund to bear the whole of the administrative expenses of the pilotage service and the maintenance of the pilot boats; that the pilotage authority should acquire and run the pilot boats with proper crews; and to introduce new pilotage rates solely to provide the pilot's net earnings, save only a deduction for the Pilots' Benefit Fund. The matter has been under consideration of the Pilotage Committee arising out of a letter from the Board of Trade and a Memorandum from the United Kingdom Pilots' Association, and it has been decided to forward copies of the proposals to every member of the Humber Conservancy Board and to the pilots' representatives. At the annual meeting of the Conservancy Commissioners the Chairman stated that the inquiry by the Board of Trade last year brought about a full investigation by the Pilotage Committee into the cost of pilotage administration and the effecting of certain savings and adjustments, the results of which were reflected in the accounts, but would be substantially greater in a full year. The gross earnings of 74 pilots in the Humber pilotage waters in 1933 were £54,881 (average £741); Hull and Goole 14 pilots, £7,020 (average £501); and the Trent, four pilots, £1,844 (average £461).

Proposal for Hull Corporation to acquire South Bridge.

A proposal has been put forward for the Hull Corporation to acquire from the London and North-Eastern Railway, the owners of the docks at Hull, the South Bridge which spans the river Hull and connects High Street and the Old Town with the Victoria Dock. At present a toll is charged, but it is considered very doubtful whether it is a paying concern, and it has been intimated by the L.N.E.R. that unless some way out can be found they may find it necessary to swing the bridge to one side and close it altogether. Such a course would be unfortunate, and it is therefore proposed that the Hull Corporation should take the bridge over, free it of tolls and be responsible for its maintenance. There is some idea that the Corporation might be able to obtain from certain Government authorities an annual grant for the purposes of freeing the bridge. A small Committee has been appointed to talk the matter over with L.N.E.R. representatives and to report.

Meeting of Bridlington Harbour Commissioners.

It was revealed at the April meeting of the Bridlington (East Yorkshire) Harbour Commissioners that since that body had been responsible for the working of this harbour £16,000 had been spent on major works and £1,315 on minor ones. Mr. S. Charlesworth, Chairman of the Works Committee, stated that the major items consisted of a new wharf and jetty costing £9,756, repairs to the North Pier £722, landing stage £296, and repairs to apron £1,257; decking of South Pier £822 and repairs to apron £80; lifeboat slipway £98, fog-horn £203, and concrete roadway on South Pier £80. He thought they would agree that some substantial and useful improvements had been effected, but these items did not represent the whole of the work carried out. Alderman J. V. Mainprize seconded, and the report was adopted. Moving the acceptance of the balance sheet, Dr. T. C. Jackson, Chairman, stated that a balance of £5,067 brought forward from last year had been reduced to £1,201. The Commissioners, however, had expended £2,827 on works and maintenance and had paid £2,000 towards reducing their standing indebtedness, and were thus gradually working themselves out of debt.

Referring to the work done since the Commissioners took over, Dr. Jackson stated that towards the expenditure they had received a grant of £7,000 from the Government. The work accomplished showed that the Commissioners had not been idle, but were animated with the desire to bring the harbour up to the greatest state of efficiency. They had, however, to proceed with caution to keep some reserves in hand. Alderman C. Holmes seconded, and Councillor J. Newby said that the request of the local fishermen for a reduction of the harbour dues had been under consideration, but when they looked at the balance sheet and took note of the amount spent on improvements for the benefit of users of the harbour, they hardly felt justified in acceding to the request at present. The new landing stage for pleasure boats would be a costly affair, but it would enable them to stretch the stage across to the North Pier, while cobles would be able to make the harbour half an hour earlier on the tide and stay half an hour longer on the ebb. The balance sheet was adopted, and the Works Committee authorised to continue with its proposals in connection with the new landing stage and report to the next meeting in July. This scheme, it may be added, in rough outline involves the construction of three miniature docks on American lines, not unlike those on the Hudson, and will give accommodation for six berths with an additional four if found necessary. The Members paid a tribute to the late Mr. John Champlin, whom the Chairman described as a typical representative of the fishing interests of the port.

The Port of Leningrad



Fig. 2. The general cargo quay front in the Port of Leningrad.

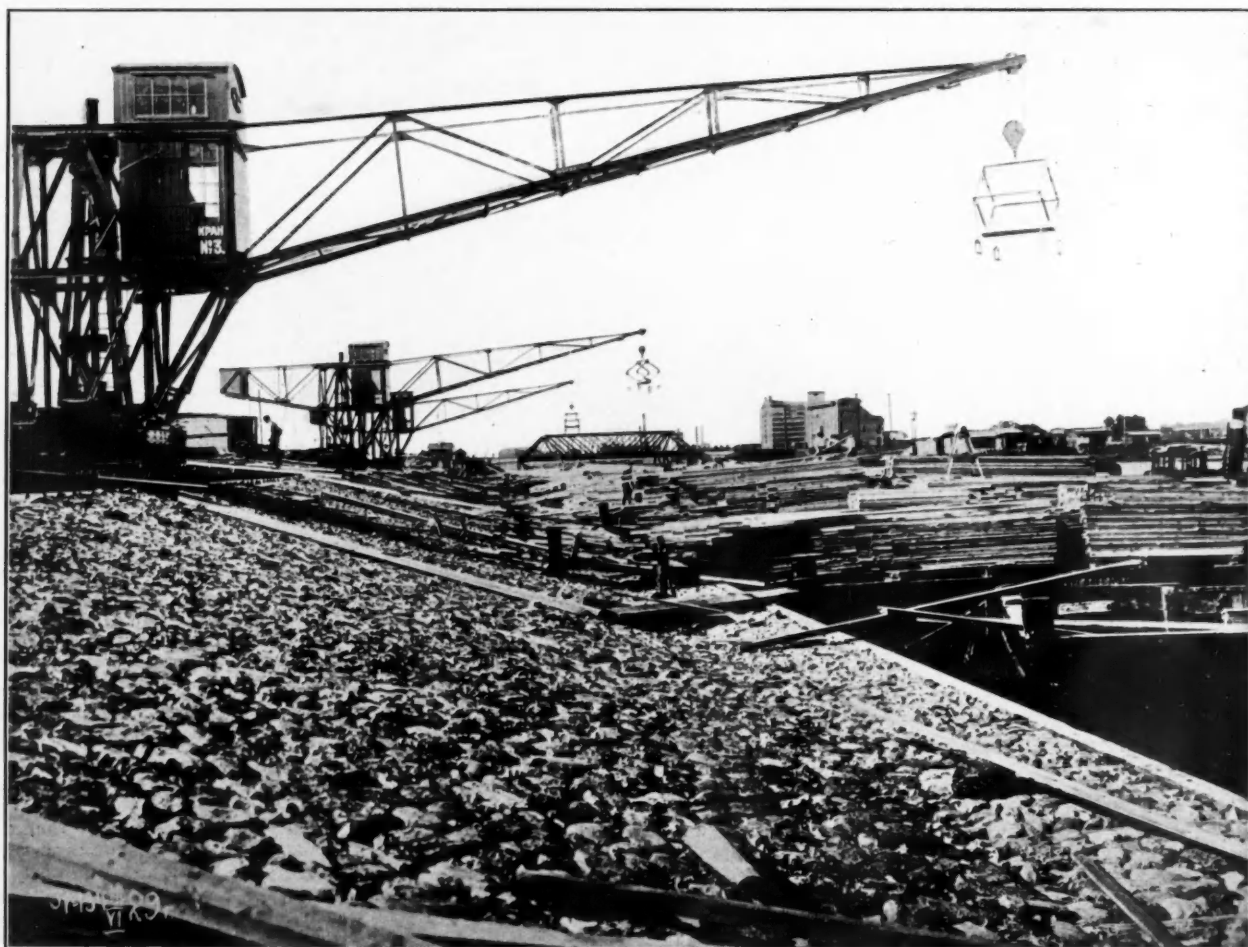


Fig. 3. The cantilever cranes on the river front of the timber section in the Port of Leningrad.

The Port of Leningrad and its Timber Section

By Professor V. E. LIAKHNITZKY, Central Research Institute of Water Transport, Leningrad

THE Port of Leningrad, being the largest of all Northern Soviet Ports, has greatly developed its territory during the last few years, and essentially modernised its equipment, thus becoming one of the most modern and well-equipped ports.

As the national economy of the country is steadily developing so the port has increased its turn-over each year in spite of the general depression of world trade and unfavourable conditions for trade on the world market.



Fig. 1. The interior view of one of the new cargo sheds in the Port of Leningrad.

Geographical and General Characteristics.

Leningrad is situated on the banks of the estuary of the Neva just at the point, where this short, deep and powerful river, which flows out from the large Lake Ladoga, encounters the waters of the eastern part of the Gulf of Finland. The geographical position of Leningrad is determined by the latitude of 59° 50' North and longitude of 30° 20' East. Leningrad is thus the most eastern port of the Baltic Sea. The port is easily reached from the open sea as its approaches are well equipped with lighthouses on shore. The natural depth reaches as far as the Kotlin Island, which is situated at a distance of 27 kilometres westward from Leningrad.

These two points are connected by an artificial sea channel already dredged out in the southern part of the Neva Bay in the years 1875-1885.

The navigational season of the Port of Leningrad usually lasts for seven months, from May to December, but by the assistance of ice breakers the navigation season may be lengthened until the end of January, and in less hard winters till February. The ice covers the Gulf of Finland from Leningrad as far as the Isle of Gotland, and in hard winters as far as Tallin (Revel).

General Description of the Port.

The Leningrad Port (see Supplement) as an estuary port consists of two parts, the river port and the sea port. The river port is situated on the whole delta of the Neva upward from the Lieutenant Schmidt Bridge (A on Supplement), which is situated near the estuary. The sea port begins from the same bridge and occupies the south-western angle of the delta. The eastern boundary of the port is formed by the river Ekateringoffka, a branch of the delta, flowing out from the so-called Great Neva at the point (B on Supplement); the western boundary is formed by the Kanonersky Island, which serves as a protection for one part of the artificial sea channel.

In the south-western direction the port territory extends along the shore of the continent; between the shore and the sea channel the water area of the port and the piers are situated. The extreme south-western boundary of the port is at present the Coal Wharf (Y on Supplement).

The first basin at the entrance from the Great Neva is the so-called "Gutuevsky Basin" (F on Supplement), which is utilised for general cargoes. This basin is 373 metres long, 2,134 metres wide. The wharf is of the stone-wall type on pile foundations, and has a length of 1,547 metres. This wharf has been constructed in a dry basin at the same time as the basin itself has been dredged out. On the wharf there are a series of sheds and warehouses. The open part of the wharf

along the bank of the Great Neva from the point where the river Ekateringoffka flows out (E on Supplement) up to the point of the entrance from the Great Neva in the Sea Channel (B on Supplement), forms a deep-water mooring front with a length of 1,130 metres. Along this wharf there are three new reinforced concrete warehouses for general cargoes (Fig. 2), and portal and jib cranes of the Babcock and Wilcox system with a lifting capacity of three and twelve tons are installed (Fig. 2).

In the south-western direction of the left bank of the Sea Channel the wharf-front extends, and is used for general cargoes, perishable commodities and grain; the shore line is covered by a reinforced slope with a wooden stockade. Along the whole of the wharf-front there are two-storey warehouses with eight semi-portal luffing cranes, a four-storey cold store with portal cranes of the same type, which is used for storing butter, eggs and meat, and has a capacity of 12,500 tons. In front of the cold store there is a reinforced concrete wharf on pile foundations.

Along the Sea Channel there are two grain elevators with a capacity of 46,000 tons.

Eastward from the southern part of the wharf-front there is a second large basin (C on Supplement), with a length of 1,173 metres and a width of 555 metres, and having accommodation for forty sea vessels. This basin is operated with timber rafts. In the interior of this basin there is a narrow jetty (K on Supplement) surrounded by small basins in the form of a comb, and named Grebenka. On the east of this basin and between it and the river Ekateringoffka on the so-called Gladky Island (G on Supplement) new mechanised timber wharves are situated, and a description of these is given later on in this article. The next large basin is the so-called Coal Basin (M on Supplement), which is situated southward and is separated from the Timber Basin by a large mole (N on Supplement), which has a length of 1,000 metres and a width of 100 metres.

The Coal Basin has a length of 1,200 metres and a width of 800 metres, and can accommodate twenty-three sea vessels.

The Coal Wharf (Y on Supplement) has a length of 960 metres; the mooring front is covered by a slope and equipped with eight bridge cranes.

Further west, on the left dam of the Sea Channel (P on Supplement) is the Petroleum Basin, which is the external basin of the port. At this point begins the rectilinear part of the Sea Channel, which is directed straight to Cronstadt. The Sea Channel is protected for a length of 13 kilometres by dams; the remaining length of the Channel (19 kilometres) lies across the open part of the Gulf.



Fig. 4. The transversal ways (for transfer cars) and longitudinal streets for narrow gauge cars in the timber section of the Port of Leningrad.

The general data for the port is as follows:—The whole length of protective constructions—19 kilometres; protected area—4.9 square kilometres; capacity—70 sea vessels and 100 barges; total length of mooring front—13.3 kilometres; total area of the port—6 square kilometres; total capacity of 87 sheds, stores and warehouses—183,000 tons; total length of railway tracks—70 kilometres; daily turnover of railway cars—1,000 cars.

The Port of Leningrad—continued

The Mechanised Timber Section.

The design of this timber basin has been based on a rational achievement of the whole cycle of transporting and timber handling processes connected with the export of timber through the Port of Leningrad; the separate elements of the whole transporting and handling installation have to satisfy the conditions of a systematical receipt of timber cargoes arriving, of a rational storing of the timber and, lastly, of fast loading on sea vessels.

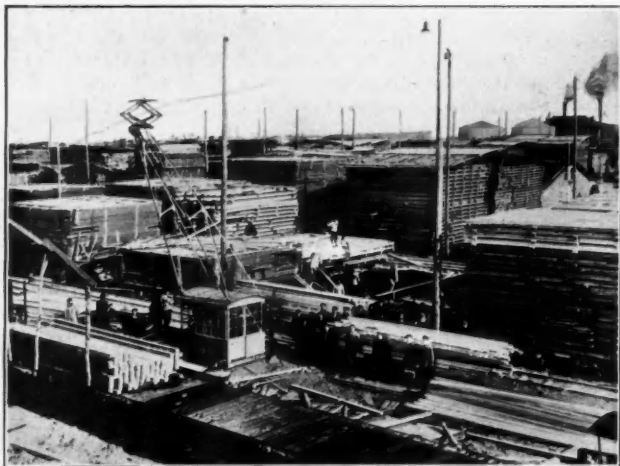


Fig. 5. The transfer car in the timber section of the Port of Leningrad.

The task of the designers consisted in organising and equipping the separate links of the whole installation in such a way as to decrease manual work, broadly applied hitherto, to a minimum; further, to decrease the loading period of vessels by a well-timed and uninterrupted loading of timber materials of different marks and as a consequence of the above, to reduce the handling cost of a cargo unit. As to the mechanical equipment of the timber basin, the principal task consisted in the choice of a most efficient system of mechanical equipment and in such a rational application of the same as to allow a harmonic and expedient flow of cargo from the moment of receiving timber cargoes from the interior to the loading on sea vessels for export.

Huge quantities of timber are directed for export through the Leningrad Port after its restoration after the World War and the Revolution. This fast development of the traffic resulted in a modernisation and mechanisation of the timber handling and storing processes, which had been executed before the War entirely by hand. The first step in this direction was the construction of the timber store and wharf on the Gladky Island (G on Supplement) with a capacity of 133,000 standards.



Fig. 7. The sorting and end-cutting arrangements in the timber section in the Port of Leningrad.

This part of the port occupies an area of 240,000 sq. metres, and two mooring fronts (see Supplement): one for barges carrying timber on the Neva and its branch Ekateringoffka with a length of about 950 metres, the other on the opposite side for 8-10 sea vessels with a deep draft. The latter front has a length of 800 metres, and is served by three railway tracks for timber cargoes carried from the interior of the country by railway; though the length of this unloading front is 800 metres, only 600 metres may be regarded as useful.

The total yearly handling capacity of the timber section is 135,000 standards, of which quantity two-thirds may be unloaded from the river side and one-third from the railway. The total monthly unloading capacity from the river side is 22,000 standards, and from the railway 11,000 standards, the total daily capacity being 1,250 standards.

The highest loading capacity on sea vessels in one month reaches 26,000 standards, or about 1,060 standards a day; thus the total handling capacity of the timber section, including unloading from river vessels and loading of sea vessels, reaches 59,000 standards, i.e., about 150,000 tons in a month, or about 6,300 tons daily.

To fulfil this work the whole process of timber handling is mechanised. For this purpose the following scheme of timber movement and the following mechanical installations have been installed (see Supplement).

The unloading of timber from 60-metre barges is carried out at the river front by means of nine electric travelling overhead cantilever cranes with a lifting capacity of $1\frac{1}{2}$ tons, and an overhanging length of 17 metres over the slope of the shore. Owing to special automatic grabs (Fig. 3), these cranes are able to make 12 cycles per hour and execute in one 8-hour shift up to 100-120 hoists. Timber packages lifted by these cranes are lowered on trucks on narrow gauge tracks railed along the river front. These trucks, carrying three tons (one standard) of

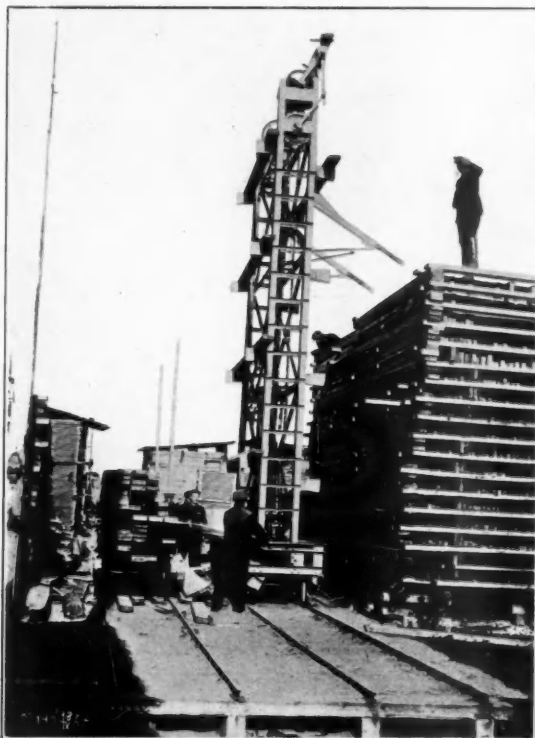


Fig. 6. The board elevator in the timber section in the Port of Leningrad.

timber, are pushed a distance of some metres to the next transversal track of the storage, where they run on to the transfer car.

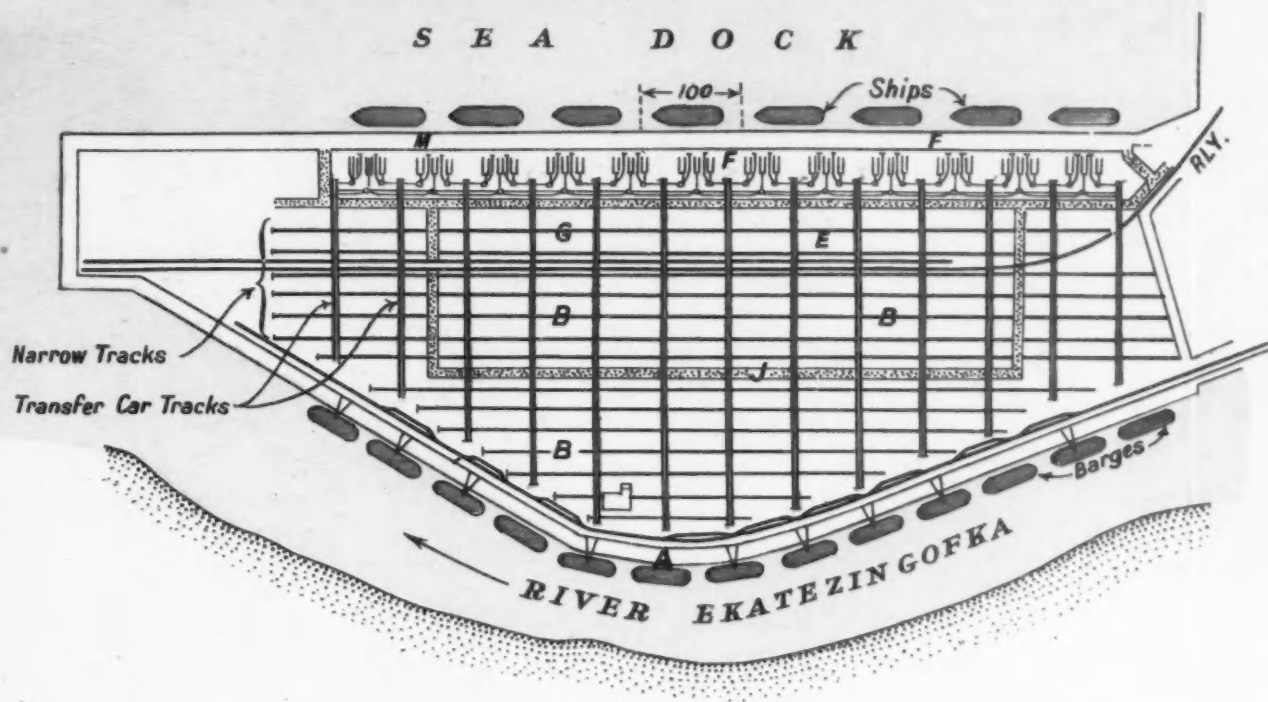
The whole storage (B-C on Supplement) is divided by 13 transversal roads, having a width of 10 metres, into sections with a length of 63 metres (along the storage). In the transversal direction the store is divided into 15 metre sections by longitudinal narrow 5-metre wide roads with two rail tracks (900 m/m gauge). (See Supplement.)

These tracks run on both ends into the above-mentioned transversal tracks. Traffic on these transversal tracks is executed by special transversal cars. The trucks on this transversal road are 20 cm. lower than the narrow gauge tracks on the longitudinal roads, so that the trucks may be easily removed from the longitudinal tracks on to the transversal cars and vice versa.

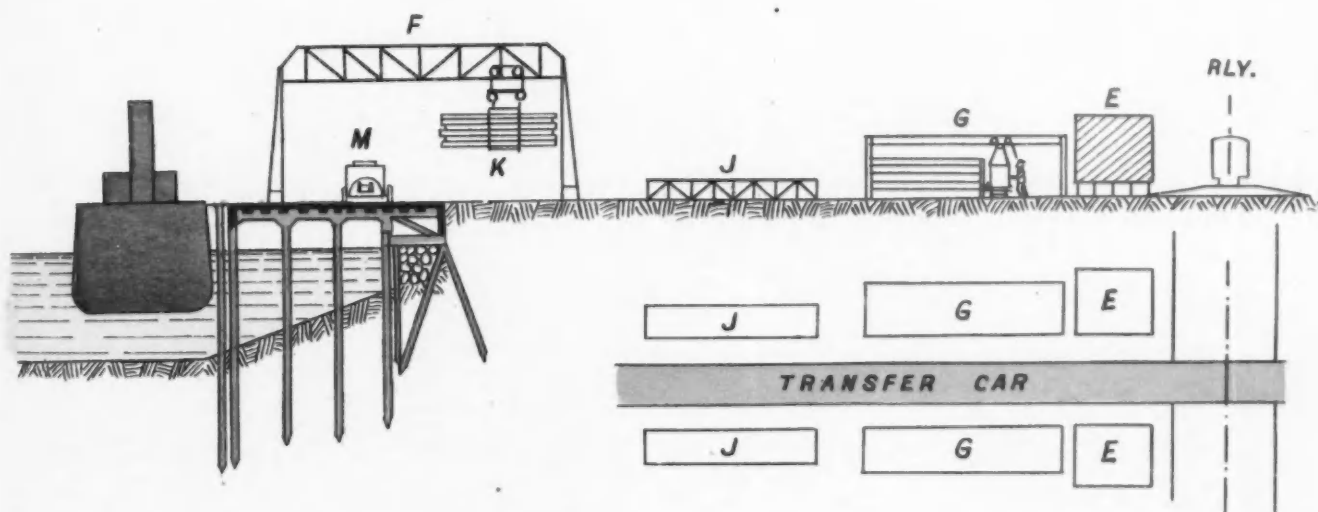
The transversal car (Fig. 5) on which five narrow gauge tracks may be located, carries the trucks along the transversal direction of the storage. Thus thirteen transversal cars are able to replace a great number of railway switches and turntables, the working of which is very difficult under northern climatic conditions. The transversal cars have a cargo capacity of 15 tons and a speed of 1.6 metres a second when loaded, and a speed of 2 metres a second when unloaded. The length of a transversal car is 13 metres.

The narrow gauge trucks loaded by cranes on the river front are moved to the nearest transversal way, which carries them to one of the longitudinal tracks; then the loaded narrow gauge truck is removed from the transversal car to one of the two

PORT OF LENINGRAD.

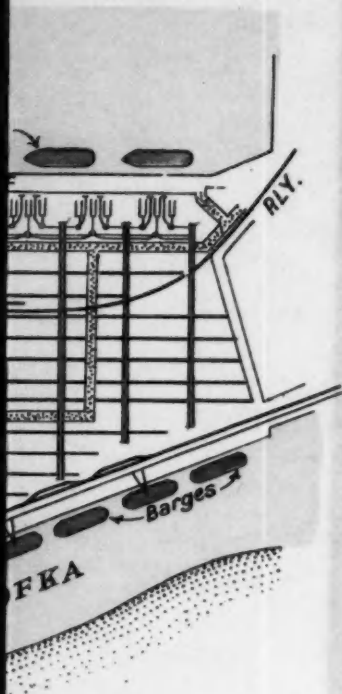


GENERAL PLAN OF THE TIMBER SECTION OF THE PORT.

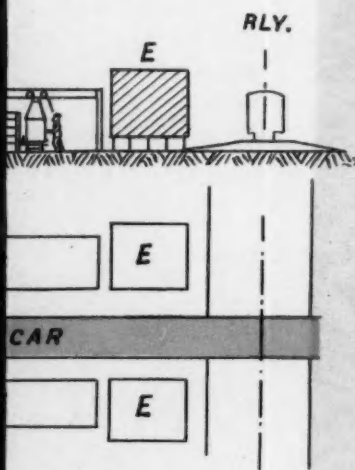


PLAN & CROSS SECTION OF TI

GRAD.



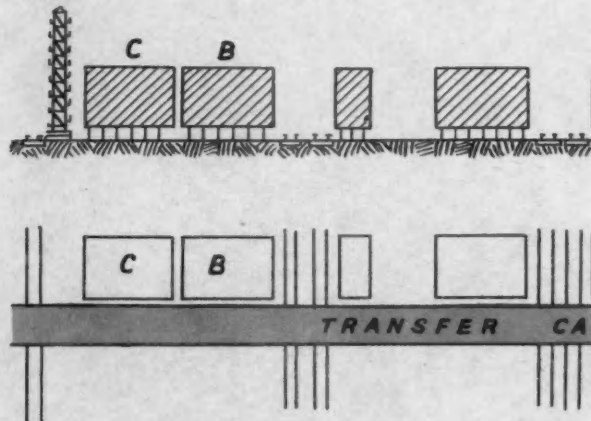
OF THE PORT.



CROSS SECTION OF TIMBER STORAGE & QUAYS.



Elevator



JUNE, 1934.

NE NEVA ESTUARY



E V A

CHANNEL

A Y

CITY OF
LENINGRAD

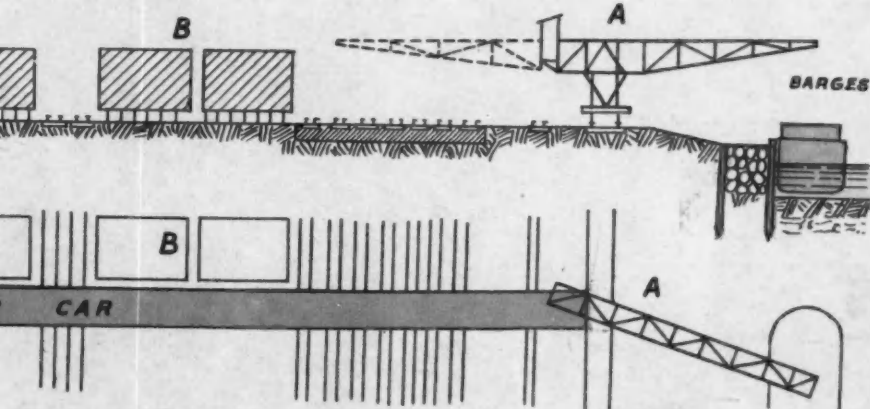
CITY OF
LENINGRAD

GENERAL CARGO WHARF

AL PLAN OF THE PORT.

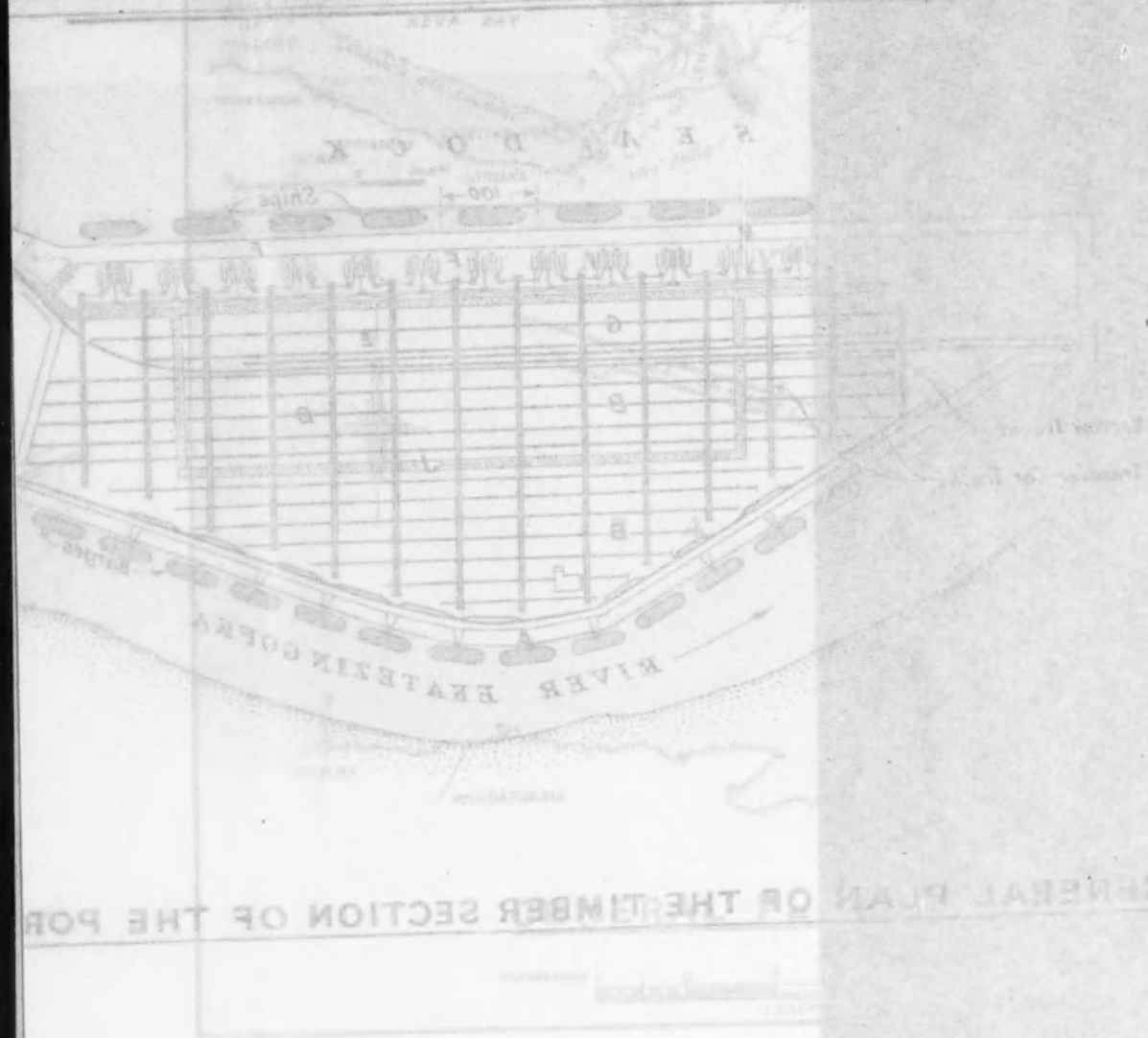
Scale.

0 1 2 3 4 5 KILOMETRES
1 KILOMETRE = 3280 FEET

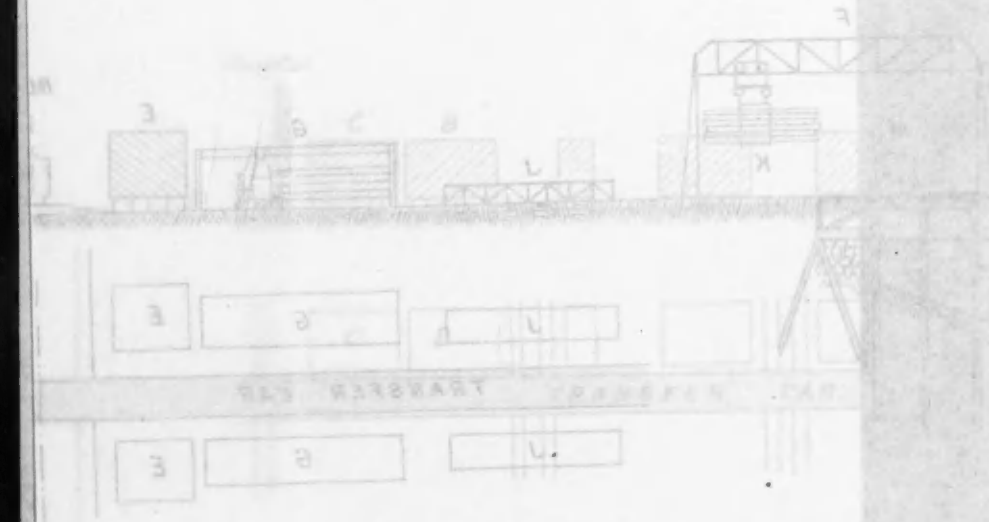


S.

PORT OF LENINGRAD



GENERAL PLAN OF THE TIMBER SECTION OF THE PORT



PLAN & CROSS SECTION

The Port of Leningrad



Fig. 8. The bridge cranes over the intermediate timber storage in the Port of Leningrad.

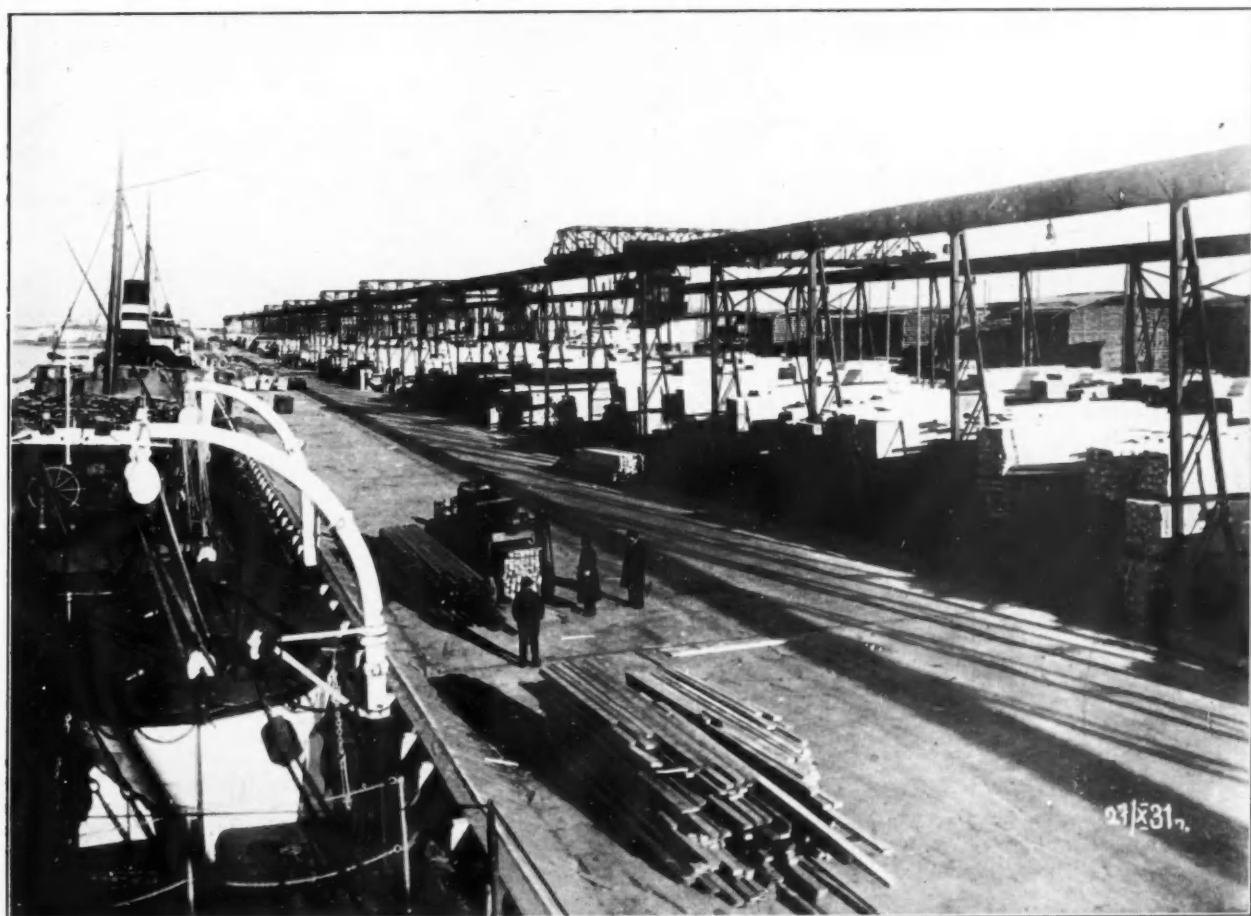


Fig. 9. The quay front and intermediate storage in the timber section in the Port of Leningrad.

The Port of Leningrad—continued

narrow gauge lines and moved to the place where the timber has to be discharged on stacks (B, C, E on Supplement).

This discharging is executed by special portable elevators (Fig. 6) moving on the other narrow gauge line. Special high elevators lift the sawn materials to a height of 6 metres and handle in a shift about 18 standards of materials. Timber arriving in the port by railway is handled by hand from normal gauge cars to narrow gauge trucks, which are located on both sides of the normal gauge line. The trucks are then driven to the stacks in the same manner as from the river front.

When timber has to be loaded on sea-vessels, it is transported by the same way, i.e., by the elevators and narrow gauge tracks to the deep water sea berth. Here (G on Supplement) the trucks are unloaded (Fig. 7) at special saw installations for cutting the ends of the boards. These installations consist of long tables, and are supplied with rollers and circular saws. The boards are taken off the trucks and put on the operating tables, on which the boards are sawn to a certain length, required for export trade. The ends of these tables are located under the span (Fig. 8) of bridge cranes (F on Supplement) which serve a space 20 metres wide along the berth front. In this area packages of timber, prepared for loading on vessels, are distributed by 10 electric bridge cranes (K on Supplement) travelling along the berth and having a lifting capacity of three tons each.

These packages are placed at this "intermediate store" on special wooden stands, from which they are taken off automatically by timber carriers. These special motor cars (M on Supplement) carry the packages to a free zone 16 metres wide (Fig. 9) at the berth and lay them down alongside the vessels. The ship's derricks load each package by two liftings ($1\frac{1}{2}$ tons each) into the holds. The motor cars easily carry timber of various sorts from different and remote parts of the store to certain vessels. If the timber after being worked up at the saw table, may be carried directly to the berth, the boards are put on wooden stands and taken off by the timber carriers.

The total area of the timber storage is 240,000 sq. metres, but after deducting the "intermediate" storage railway tracks, various roads (J on Supplement), etc., there remains a net area for timber stacks of 90,000 sq. metres. There are places for 1,200 stacks. The total capacity of the main storage is 30,000 standards. The capacity of the "intermediate" storage is 2,000-3,000 standards.

The work of the Timber Section of the Leningrad Port during a three-years' period has shown satisfactory results, exceeding the designed output and fulfilling all requirements of transport and storing without any casualties.

Owing to the favourable experience gained with this Timber Section it may serve for the purpose of constructing timber port sections in other Soviet Ports with a large timber cargo traffic.

North-East Coast Notes

Cheery Trade Signs.

IT is always pleasing to find in trade statistics signs that the much-vaunted improvement has some substance in reality, and therefore there is satisfaction in noting that the latest available figures of coal shipments for the past eighteen weeks on the North-East Coast, including Tyne, Blyth, and Sunderland and the Hartlepoons totalled 9,348,556 tons, compared with 8,545,673 tons in 1933. Another statement is in respect to idle tonnage in the Ports of Great Britain and Ireland. This showed that at April 1st there were laid up in United Kingdom ports, 449 vessels of 1,069,716 net tons, indicating, when compared with the return for January 1st, a decrease of 160,529 net tons, or 13 per cent., and when compared with the return for April 1st, 1933, a decrease of 784,793 tons, or 42.1 per cent. The Tyne showed a slight increase in the past three months of 16,000 net tons, but comparing the official figures at the end of last March—112 vessels of 254,191 tons, with those of twelve months ago, 147 vessels, of 316,661 tons net register, a marked improvement is to be noted.

The same cheerful tone was observable at the meeting of the Tyne Improvement Commission in April last, when Mr. W. A. Souter, in moving the report of the Docks and Trade Committee, said in the past quarter the coal and coke shipments from the Tyne were 3,655,624 tons, or 434,458 tons more than in the corresponding period of last year. The increase was made up of 314,000 tons foreign, and 120,000 tons coastwise. To the Mediterranean and the Black Sea there was an increase of 109,000 tons, and to ports from the Elbe and Brest 91,000 tons. Bunker shipments were 48,000 better than in 1933. This quantity was made up of 20,000 tons of cargo vessels proceeding to near Continental and Mediterranean Ports, 9,000 tons for "bunkers-only" vessels, mainly to the United States of America, New Zealand, West Africa, and West Indies; and 11,000 tons for fishing vessels. There has also been a substantial increase in merchandise in the port, mainly timber. Imports were up 60,000 tons, or 17 per cent., and exports 34,000 tons, or 78 per cent. on the first quarter of last year.

Alderman T. Sykes remarked that the revenue of the Authority in March was £6,633 higher than in February, which, he said, was a good sign. Sir George Lunn drew attention to the fact that the trade of the Tyne had very definitely improved. "Trade is really improving," he added, "when winter comes, spring is not far behind, and I have an idea that spring must have come. Gradually and surely the trade is getting better. We used to be told, month by month, of decreased shipments, but now we can see that the tide has turned."

Encouraging reports were presented at the May meeting of Newcastle Corporation's Trade and Commerce Committee, Alderman Walter Lee being in the chair. Thus 1,463 vessels used Newcastle Quay in the twelve months ended March 31st, as compared with 1,419 vessels in the previous twelve months. The total income for the same period amounted to £33,138, being £488 more than the corresponding amount of £32,650 for the previous year, representing an improvement in traffic both coastwise and overseas.

Trade at Blyth, too, is still on the upgrade, despite previous records. The coal shipments for the first three months ended March 31st were: 1934—1,637,440 tons; 1933—1,416,147

tons; 1929—1,322,411 tons. The shipments for the first three months show an increase of 221,293 tons on 1933, and 315,029 tons on 1929, representing 16 per cent. above 1933, and 24 per cent. above 1929.

Tyneside Losses.

May deprived Tyneside of two prominent business men—Alderman J. F. Weidner and Alderman M. C. James. Alderman John Frederick Weidner was principal of the shipowning firm of Weidner, Hopkins and Co., and Chairman of the Elswick Steam Shipping Company, Ltd. He was also Vice-Consul for Cuba, Venezuela and Panama, and one of the oldest members of the Newcastle Consular Corps. Alderman Matthew Coulson James was Chairman and Managing Director of the Mercantile Dry Dock, Ltd., Jarrow, and a Director of several other industrial concerns. Alderman James was of the fast dwindling band who assisted to build up Tyneside into the important shipping and ship-building and ship-repairing centre which it is to-day, and he was well known in all the business centres in the country.

Trade of the Wear.

The trade return for the Port of Sunderland for the first quarter of this year makes a mixed showing, for while the coal and coke shipments at 1,063,577 tons are 29,576 tons down, other exports at 16,541 tons show an increase of 8,499 tons. Imports also are higher, the quarter's total at 57,280 tons being up 2,951 tons on the same period of 1933.

The Sunderland Shipowners' Society have addressed a letter to local authorities on the North-East Coast suggesting that they should consider including in all their contracts for public works a clause that all materials for such works should be carried in British ships. The letter has been sent to Sunderland, Newcastle, Gateshead and South Shields Corporations, and the River Wear Commission and other local authorities in the district. Emphasis is laid in the letter on the fact that foreign vessels compete at low rates of freight because the wages paid to the crews are only a fraction of those paid to British seamen.

Hartlepool's New Record.

A new day's record of coal shipment from the Hartlepoons was created in the early days of May. Shipments on May 7th totalled 19,930 tons. The previous highest figures for any one day's working at the port were 19,082 tons on July 3rd, 1933. The present record has been achieved despite the fact that one of the main berths at Hartlepool is temporarily out of use while renewals are being carried out.

With one fewer working day than in March the April shipment of iron and steel from the Tees totalled 39,871 tons, compared with 45,711 tons in the preceding month. The decline was chiefly in pig-iron clearances, which were down 4,015 tons, while finished iron and steel shipments totalled 28,851 tons, compared with 30,676 tons in March. One more blast furnace has been started in the Cleveland, and with twenty-nine operating there are now more furnaces at work than at any time since July, 1930. The April imports of iron totalled 144,438 tons, which is 10,000 tons more than in March and the highest tonnage for over four years.

The Humboldt Bay Jetties

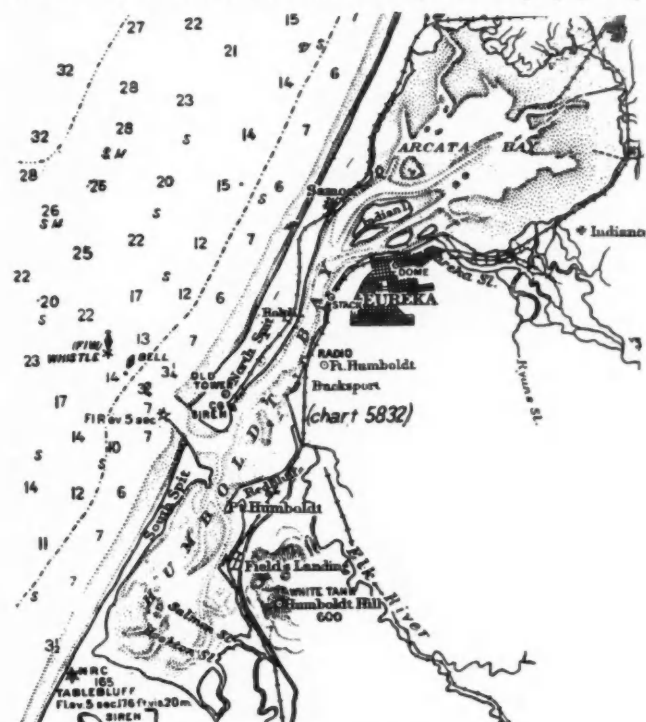
By Lieutenant-Colonel HENRY A. FINCH, Corps of Engineers, U.S. Army

THE two jetties that establish the entrance of Humboldt Bay, California, have provided the United States Army engineers with many interesting problems. Originally started 45 years ago, these structures have required heavy maintenance, in the course of which a variety of construction methods and materials have been employed.

This article is intended to cover these jetties in a general way, to illustrate the methods used in their periodic rehabilitation and maintenance, and to discuss the results of this large-scale construction project.

General Description.

Humboldt Bay is an indentation or bight in the north-western California coast, about 100 miles south of the Oregon boundary line. (Map 1). The bay is 25 miles long, with a width of half a mile to two miles. Its area at low tide is 11 square miles; at the level of the 6-ft. contour above that datum it is 25 square miles. Separating the bay from the ocean are two low, narrow sand spits averaging perhaps



Map 1. Humboldt Bay, California, 1934.

less than half a mile in width. No streams of consequence are tributary to this waterway. Somewhat south of its mid-point it is connected with the ocean by an entrance which, before stabilization, varied from 2,000 to 4,500 feet in width. The channel through this entrance, in its natural state, was shifting and dangerous, being uncertain as to position, width and depth and averaging a mile in length. Normally it afforded a depth of 12 to 15 ft. at mean low water, but this figure ranged from 9 to 25 ft. The bar crossed by the channel (approximately a mile seaward of the heads) was a crescent-shaped obstruction characteristic of locations where the ebb flow from confined tidal waters meets the ocean breakers and the two sand-moving forces neutralize one another.

The north-west Pacific coast is notoriously stormy; some masters have maintained that nowhere else have they encountered such waves as off Humboldt. However this may be, the fact remains that the entire crescent of the original bar (40-odd years ago) was nearly always a field of breakers, and ships were often bar-bound there for days at a time. Such interruptions to commerce occasionally occur even under the present improved conditions.

The storm gales during the autumn and winter months commonly come from the south-west. During this period there is a northerly current past the entrance, while in the summer season the movement is in the opposite direction.

The bay has two unequal diurnal tides that characterize the California-Oregon coast. These vary from neap tides of $2\frac{1}{2}$ ft. up to spring tides of 9 ft. or more, the normal range being about 6 ft. Minus tides of as much as $1\frac{1}{2}$ ft. occur. A tidal range of 6 ft. in this bay displaces 2,755,000,000 cu. ft. With

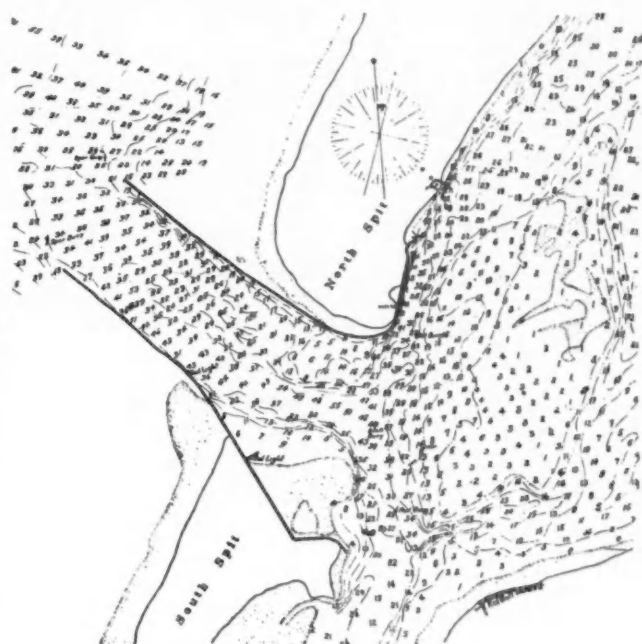


Fig. 2. Entrance to Humboldt Bay, California, May, 1903.

an ebb of 7 hours, this indicates a mean discharge of 110,000 cu. ft. per second, with the maximum flow twice that amount.

Outside the entrance the ocean bed slopes regularly for a mile or more at the rate of 50-ft. per mile.

Under natural conditions the head of the south spit retained its normal shape and position fairly well, but the opposite head was often attacked and heavily eroded. In the eight months between September, 1881, and June, 1882, this spit receded about 2,000 feet, losing 45 acres in area and more than a million cubic yards in volume. A like change had occurred in 1858 in connection with a movement of the bar channel that shifted the seaward end thereof more than a mile and a half from north-west to west of the entrance. Thus the width of the entrance varied with the condition of the north spit.

The bay provides an important harbour, an ocean outlet for a vast supply of redwood timber. The town of Eureka, 6 miles from the entrance, was established on the north-eastern shore in the early days, and 40 or more lumber mills were set up through the region. A thriving business developed when redwood was at the height of its popularity. The greater part of the city of San Francisco as it existed before the earthquake and fire of 1906, was largely built of this material. More recently, in the decade ending 1926, a brisk trade in redwood products was carried on with Australia and New Zealand. The normal commerce of Humboldt Bay in the years preceding the depression averaged more than 500,000 tons annually. Of this about 65 per cent. was in lumber and timber products.

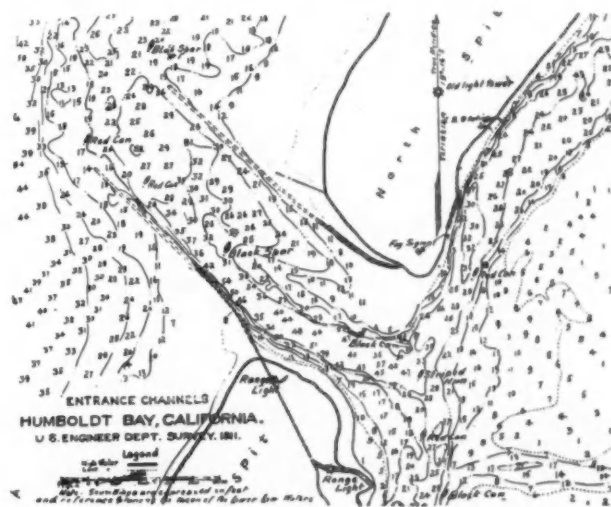


Fig. 3. Entrance Channels, Humboldt Bay, California, 1911.

Humboldt Bay Jetties—continued

First Operations: Brush Barriers, Rubble Mound Jetties.

In the absence of a rail line to serve the Humboldt Bay region and before the day of motor transportation with the superb highway systems that make this transportation possible, it is easily understood why the harbour should have been the life of the redwood industry.

Recognizing this fact, the United States as early as 1882 attempted to improve and stabilize conditions at the entrance. It was realized from the beginning that it would require at least one jetty to control the entrance channel satisfactorily, but federal appropriations for this isolated harbour on the west coast were few and far between in those days; consequently recourse was first had to cheaper methods.

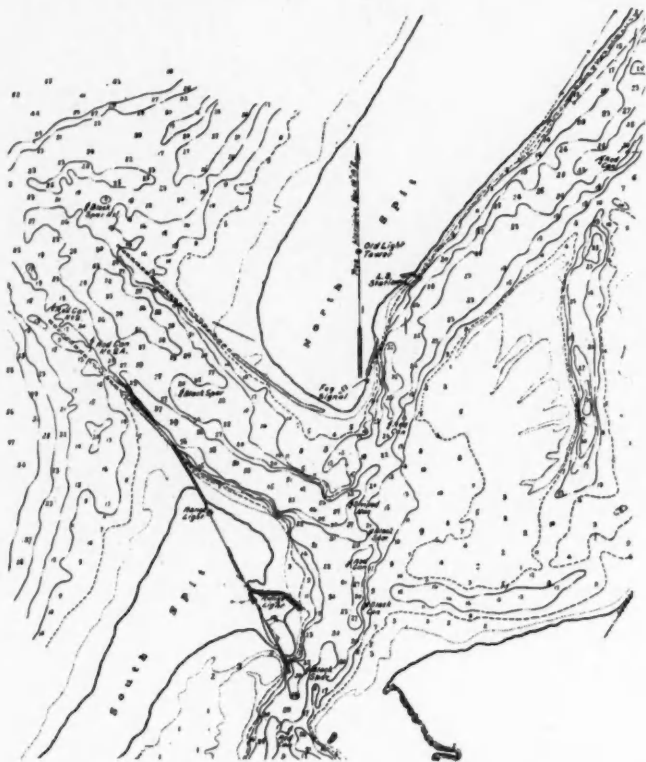


Fig. 4. Entrance Channels, Humboldt Bay, California, 1912.

In an attempt to stop the intermittent erosion of the north spit in the early 'eighties, the engineer of that period, Mr. A. Boschke, resorted to barriers of willow withes or shoots. Fine, pliable shoots, 4 ft. long, were set upright in rows, with their butts firmly pinned between a pair of 2-inch planks on edge, bolted together. This provided a line of brush, the top of which was about 12 inches thick. These portable barriers were set out in a series of squares over the threatened sand area, the planks being sunk with their upper edges flush with the ground surface and bolted to 4-in. by 4-in. piles, 7-ft. long, driven to full length. The breakers, meeting a succession of these barriers, were checked and thereupon deposited some of their sand burden. At first definite improvement was noted, but within a few weeks the bar channel went through one of its major cyclical paroxysms, swinging widely to the south. This radical change brought heavy erosion against the north spit which soon undermined the barriers. The experiment was never repeated.

As early as 1882 a project was adopted for a low-tide stone jetty, founded on a brush mattress, to spring from the south spit and project seaward for 6,000 feet on the south side of the channel. Due to the normal trend of the natural channel it was thought that the entire 6,000 feet or, at any rate, 5,000 feet of the structure should extend north-westerly from its origin. If the 5,000-ft. length on that tangent was found to be sufficient, it was proposed to extend the outer 1,000 feet due west. The estimated cost of this improvement was \$600,000 or \$100 per lineal foot. The main south jetty as finally built was constructed on a single north-westerly tangent.

Several years elapsed before the small annual appropriations totalled enough to justify beginning construction. The necessity of having to condemn land on the south spit also delayed commencement for a year or more. Early in 1888 a contract was let for this work at the following rates: stone, \$2.00 per ton in place; brush work, \$1.85 per cu. yd. in place; trestle and track over water, \$5.50 per lineal foot; track on shore, \$2.75 per lineal foot.

The contractor hauled his stone 9 miles, 2 of which were over water. Car-ferry barges, equipped with standard gauge

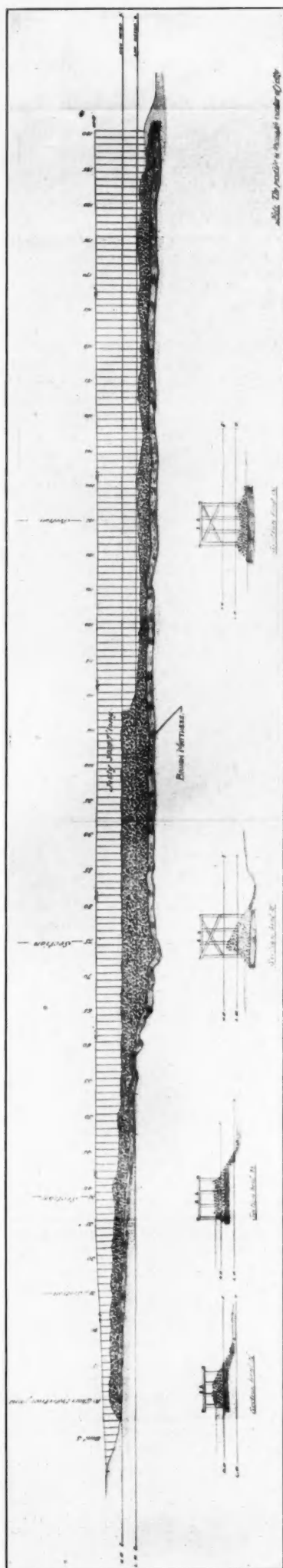


Fig. 1. Humboldt Harbour, California. Profile of Jetty, 1891.

Humboldt Bay Jetties

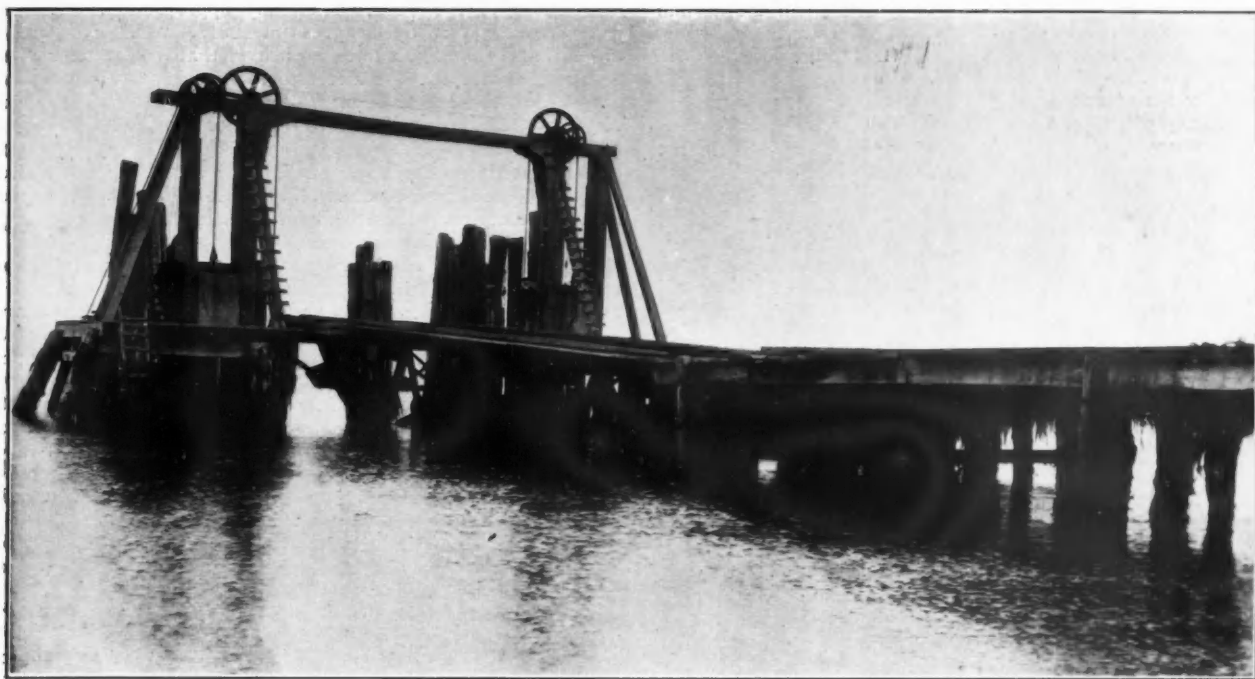


Photo 1. South Jetty, Apron and Approach, from Shore. July, 1920. Piles partially destroyed by sea worms. Tide + 4-ft.

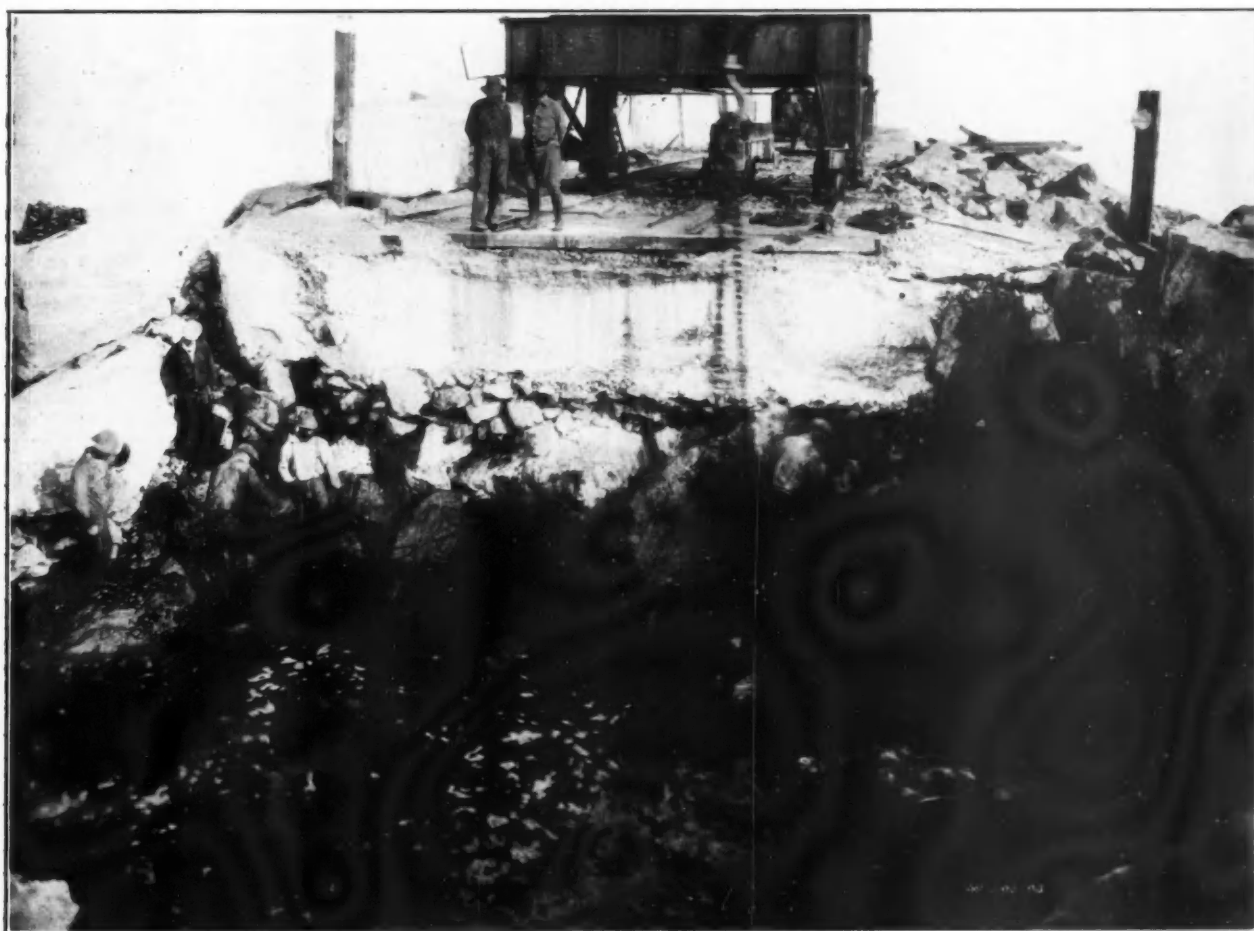


Photo 2. Excavating Pit for Monolith of Concrete at end of North Jetty. Concrete Cap at this point was 7-ft. thick. September 1925. Tide + 3-ft.

Humboldt Bay Jetties—continued

tracks (4 ft. 8½ in.) and carrying six 40-ton flat cars, were employed, the cars being transferred to and from the barges by means of unloading aprons—through Howe trusses of 60-ft. span. Deliveries totalled about 500 tons per day.

By June, 1891, 3,039 feet of the jetty had been placed, the inshore 1,800 feet being up to high tide level and the remainder submerged, as shown on the profile sketch. (Fig. 1). The trestle from which operations were carried on, had the normal 4-pile bents with the rail 15 ft. above high water.

The brush mattresses averaged 4½ ft. thick and 45 ft. in width. These were assembled on piles slung across the trestle-work under the caps sills, were weighted with stone, and then dropped into place at slack water. They were ballasted as quickly as possible with ordinary stone and the enrockment was then brought up to the levels indicated.

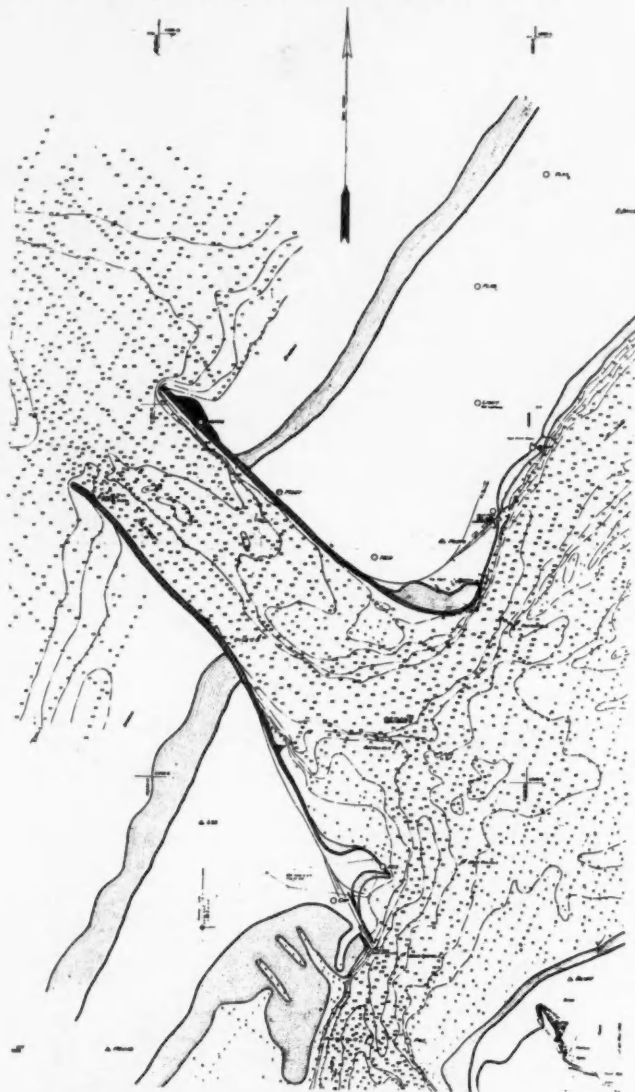


Fig. 5. Entrance to Humboldt Bay, California, showing present conditions, 1934.

The outside armour consisted of stones averaging up to 10 tons in weight—the largest that could be quarried and handled with the machinery then available. The rock fill was 10 to 20 ft. wide at the high tide level. It required six tons per running foot to sink and hold the mattresses.

The normal depth of water on the line of the jetty was originally 3 to 5 ft. at low tide, but as the work progressed, scouring took place in advance of the jetty and seaward of the first 800 feet the mattresses were placed in water from 8 to 12 ft. deep.

Up to this point no improvement was made in the channel conditions as a result of the construction work, nor had any been expected. A heavy accretion of sand occurred at the angle between the jetty and the spit, and the erosion of the north spit was considerably accelerated.

The cost of the work up to this point was about \$150,000. Almost half of the originally proposed low-water project was completed for only one-fourth of the original estimate of cost; but it will of course be noted that the portion in place covered the very shallow shore end of the jetty.

In the autumn of 1890, a board of Army engineer officers recommended establishing the south jetty at high-tide level throughout its proposed new length of 7,800 feet, and building a parallel jetty, 6,700 feet long, of the same brush and stone

type, seaward from the end of the north spit, both jetties to extend to the 18-ft. contour at the entrance, with the distance between them to be 2,100 feet. Shore protection works were included in these overall lengths. The north jetty was to be started before completion of the south jetty if erosion made this necessary. The total cost of these structures, together with the required bank protection, was estimated at \$1,715,000, in addition to the \$342,000 already appropriated. This project was authorised by Congress in 1891. In 1890 the erosion of the north spit became so heavy that the entrance was widened from about 4,000 feet to as much as 5,600 feet, with a tendency to become even wider. It was thereupon decided to build bank-protection works of stone mounds resting on brush mattresses—following the model of the south jetty operation except that a 2-pile per bent trestle was to be used instead of the 4-pile bent structure employed at the more exposed southern location. This shore protection was to be prolonged into the proposed north jetty.

Construction by continuing contract (under which the contractor undertakes the work with the understanding that its continuity is dependent upon annual appropriations) was started on both jetties in 1891 with the following unit prices: 57,000 tons of rock at \$2.10 per ton in place; 13,000 cu. yds. of brush at \$1.75 per cu. yd. in place; 2,000 ft. of trestle and track over water at \$6 per ft.; 1,000 ft. of track on shore at \$2 per ft.; apron wharf and approaches (for north jetty), \$1,500; trestle for shore protection work on north jetty, \$3.75 per ft.

By June, 1891, 8,200 tons of stone had been delivered to the south jetty, restoring it to high-water level between points 900 and 1,800 feet from the origin, and raising the remaining 1,200 feet to approximately low-water level. Preparatory work on the north jetty project, involving construction of shore track and a car ferry landing, had been accomplished.

For the next eight years until the completion of the two-jetty project in 1899, work was carried on as continuously as the availability of funds and the state of the weather permitted. The normal working season extended from April or May to October, and it was often necessary to spend time and money at the beginning of the season in renewing trestle bents destroyed by the preceding winter's storms. No work was done in the calendar year 1892, due to lack of money. Reports of the engineers of that period repeatedly stressed the loss suffered by the Government due to the enforced delay in completing this project.

The following is a summary of the points of interest pertaining to the construction period ending 1899:—

(a) The shore protection work arrested the erosion of the north spit, and caused it to build up again. Sand from the seaward side of the stone mound was frequently deposited on the landward side to the level of the top of the enrockment, in a single tide.

(b) For the inshore portion of the north jetty, the less severe wave action made it possible to use two brush mattresses (averaging 4½ ft. thick) under the jetty instead of one, thus saving six tons of stone per lineal foot.

(c) In this heavily-timbered region, the beaches were lined with driftwood. Considerable damage was done to exposed trestle-work during winter storms by floating logs and tree trunks. These, acting as battering rams, did heavy execution.

(d) It was estimated that by 1893 the south jetty, then 3,700 ft. long, had arrested two million cu. yds. of sand on its seaward face.

(e) In 1893, when the north jetty proper had reached a length of about 2,000 ft., it was noted that the channel was approaching the south jetty. In the apprehension that it might undermine the structure, seven spur dykes or groynes were run out perpendicularly from the main enrockment in 1894-95, the first being located at bent 80, the others progressively at bents 100, 120, 135, 150, 165 and 190. (See profile, Fig. 1.) These were rubble-stone mounds about 36 ft. long and 25 ft. wide, resting on brush mattresses, except those at bents 165 and 190, which were of stone throughout. These groynes cost \$500 to \$900 each. Three were also built about midway out on the main portion of the north jetty.

At one time it was feared that these structures as located were having the effect of pulling the thread of the current toward the jetty that they were intended to protect, but no such result occurred in great degree, and it is probable that they had little effect among the larger factors affecting the location of the channel. Construction of these spurs was soon abandoned, and no trace of them is observable to-day. During this period a considerable tonnage of stone was used to riprap the channel side of the south jetty to prevent undermining.

(f) By June, 1894, with the south jetty 3,700 ft. long and the north jetty 5,200 ft. (of which a section of 3,800 ft. only was complete in cross section), the channel showed marked improvement, having a depth of 24 ft. below mean low water, over a width of 950 ft., as compared with a prevailing depth of 18 ft. during the preceding few years. This channel extended in a south-west direction.

Humboldt Bay Jetties



Photo 3. Building Concrete Monolith near South Jetty Head, August, 1915. In 1931-32 pre-cast concrete blocks were used instead of large stone to build up from for monoliths.

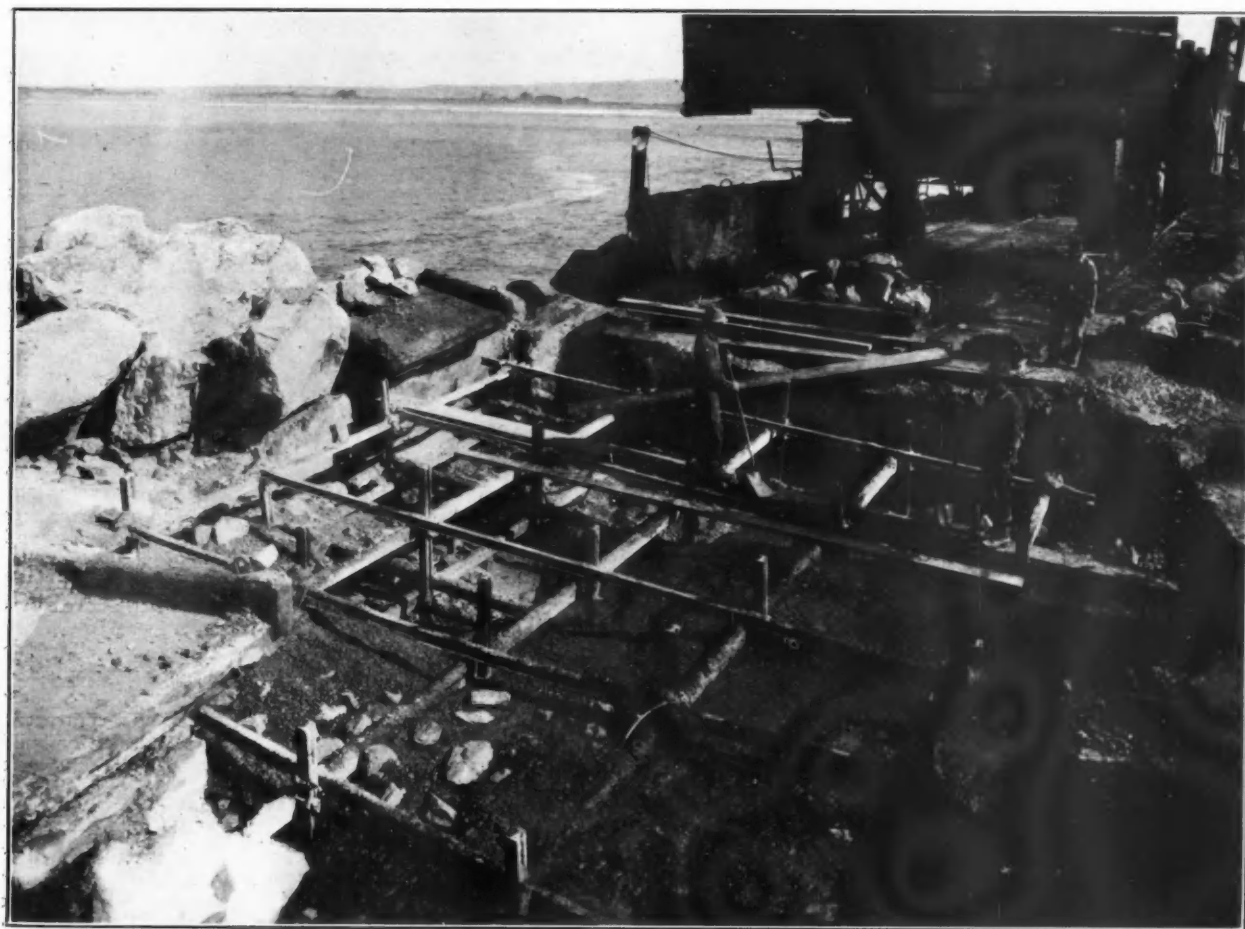


Photo 4. Building Monolith, Outer End of North Jetty. Pit about two-thirds full of concrete. September, 1925.

Humboldt Bay Jetties—continued

(g) In 1893-94 heavy scouring took place in advance of the south jetty, the depth there increasing to as much as 50 ft. On this account, the extension of this structure beyond its 3,700 ft. on length was postponed until 1895 when shoaling occurred over the deepened area as the channel shifted north again.

(h) The north jetty was completed in 1897, with a total length of 7,000 ft., including 2,500 ft. of shore protection wall. Two years later saw the completion of the south jetty, 7,400 ft. long, including shore protection works of 2,300 ft. The "official" lengths of the south and north jetties proper were fixed at 5,100 ft. and 4,500 ft. respectively. The crown of each structure stood 10 ft. above low-tide level, and the entire ebb was concentrated on the bar. The channel in 1899 was 28 ft. deep, over a width of 1,350 ft.

Up to June, 1900, the two jetties had cost \$2,040,000.

It was expected that as the jetty crowns were somewhat reduced under punishment by wave action, the channel depth would deteriorate. At present, 34 years later, with the crowns maintained 15 ft. to 19 ft. above low-tide level, the available depth is 27 feet, the channel paralleling the south jetty rather closely and crossing the bar on a line a little west of north from the jetty-head. Depths of 40 ft. to 45 ft. exist off the end of the south jetty.

For several years the effects of the jetties were all that had been anticipated. The survey of 1903 (Fig. 2) shows entrance channel conditions typical of that period. For straight alignment and depth the channel was most satisfactory; the depth being never less than 26 ft. at low water, and for considerable periods being maintained at 30 ft.

However, this happy state of affairs was not to last. The jetties were in place in violation of the wishes of the Pacific Ocean, and its efforts to remove them soon took effect. Severe wave action reduced the enrockments, mainly by washing away the smaller stone from the armour, allowing the larger pieces to be then displaced. In spite of the 10 ft. elevation of the crown, waves sweeping over the structures would wash out the slope opposite the point of impact, thus removing the support from the foundation of the armour pieces on the crown, allowing them to be rolled down the reduced slope. Large waves from the south-west, echoes from distant storms, would also thunder against the enrockments, dislodging even the heaviest stones from their exposed southern slopes.

In a few years the outer ends of both jetties had been demolished enough to impair their usefulness. By 1907 these portions had been buried under sand 14 ft. to 18 ft. deep. The south jetty had been battered down, not only at its outer end but also over a short section at the angle between the enrockment and the shore. The material moved over the jetty at this point at flood tide was carried cut through the channel on the ebb and deposited to form a narrow bar, continuing the line of the south jetty and curving northward to cross the line of the north jetty prolonged. The result was a crooked channel, difficult in all weathers and unusable in times of fog and storm. The survey of 1911 (Fig. 3) shows that the south spit bar extended across the entrance with but a slight depression for a channel. During these unfavourable years, even coastwise vessels, on regular runs to Humboldt Bay, had to secure the services of local pilots.

The original estimate for the 2-jetty project had been \$2,057,000. Up to 1900 the expenditures were \$2,040,000. By 1912 this sum had mounted to \$2,179,000, maintenance charges having averaged more than \$10,000 per annum over the thirteen years since completion. Had the jetties proven themselves to be stable structures, there would have been no cause for concern but, on the contrary, the full amount of the estimate, and more, had been expended—and the problem of stabilising the entrance remained unsolved. For its money, the United States could show only two dilapidated enrockments, at which the waves ceaselessly pounded. At this stage, a new factor entered into the contest between engineering on the one hand and economics on the other. The problem presented by the entrance channel had been, and still remained, a challenge to the Army engineers. They had found economic justification for the recommended expenditures in the fact that Humboldt Harbour was the sole outlet for an immense region, covered with a heavy growth of virgin timber of unique quality.

However, by 1912 a railroad connection, from Eureka through to San Francisco, was definitely in prospect (the line was completed in 1915), and this altered the economic pattern. Rail lines could, of course, carry redwood lumber to all parts of the United States, and could haul to San Francisco for transshipment, the consignments for foreign countries. No longer could the harbour be counted as an indispensable transportation utility—granting that the cost of rail shipment was far in excess of shipment by sail or steamer.

The excessive cost of rail hauls for lumber, the desirability of maintaining a deep-water harbour in Humboldt Bay, a natural disinclination to admit defeat—these combined to bring about a decision to restore the jetties.

In this case, as in the original 2-jetty project, it was clearly recognised that the cost would be heavy. The estimate contemplated an expenditure of \$3,200,000 for new work, plus \$1,900,000 for maintenance during the construction period, a total of \$5,100,000. Emphatically, the Army engineers "had caught a bear by the tail."

Rehabilitation operations for the south jetty began in 1912. Within three months the impaired section at the angle of the enrockment and beach had been restored, whereupon channel conditions improved considerably (Fig. 4). However, during the period September, 1912—January, 1913, the jetties were subjected to an almost continuous pounding from extraordinarily heavy waves. This carried the accumulated sand lying near and beyond the end of the south jetty into the entrance, making navigation very difficult again. It was seen that complete rehabilitation was necessary before the investment in the jetties could be counted upon to pay dividends in the form of a permanently stabilised entrance channel.

In connection with this phase of the repair operations, it was recognised that stones heavier than 10 tons would be needed to hold the crown and slopes, the ocean having repeatedly demonstrated its lack of respect for anything so light.

A maximum weight of 20 tons was adopted for the armour pieces, and it was stipulated that these be placed individually by crane instead of being dumped, as had been done previously, from the elevated track.

Resort to Concrete Construction.

In order to provide a stable working platform for the gantry crane needed for such loads, it was decided to use the existing enrockment as a base, rebuilding it with rubble stone to about two feet below grade and bringing the structure to grade by means of a concrete cap or coping extending over most of the 25-ft. crown. This concrete slab was to carry the crane track (18-ft. gauge), with the ties buried in the mass. This concrete work was to be applied to the outer 3,000 ft. of the south jetty; later it was applied to the north jetty also.

Stone was to be delivered under contract, as in earlier years, by flat-car ferry, apron (Photo. 1), and shore track, all equipment being of standard gauge. The rails of the crane track were utilised in laying double tracks for the locomotives and material cars. All placing was done by hired labour.

The decision to resort to concrete was of major importance. The engineer of that time, Mr. Morton L. Tower (later killed in an accident on this work), wrote in 1912:—

"The main idea of the concrete is to hold the track when the jetty is swept by waves. The only portions of the structure that will float are the ties, and these are firmly imbedded in concrete. A further advantage of the concrete cap method is that the ties are the only portion of the structure which is not of a permanent nature and an addition to the value of the jetty. The concrete top on the crest will greatly retard the unravelling action of the waves and, when finally broken up by settlement and the washing away of the rock slopes, it will still be of value as jetty material."

Before deciding on the concrete cap, the officials concerned gave thought to the proposal to restore the trestle from which the original enrockment had been placed, or to build another trestle paralleling the enrockment and strong enough to support the gantry crane. The latter suggestion was discarded, because of the cost of a trestle of such heavy-duty capacity, and also because it was desired to take advantage of the stable enrockment as a base for crane operation. Building a trestle over the enrockment itself presented a hard problem, in view of the fact that much of the jetty was submerged and all of it had been beaten into a compact mass by the storms of many years. In more recent years (1932-33) the contractor on the repair of the jetties at the mouth of the Columbia River erected his trestle-work over the old enrockment, driving piling through the mass in some cases, and in others adjusting the trestle supports to the top of the enrockment as a foundation. In this case, however, the enrockment stood above low-tide level.

After full consideration of the factors involved, it was decided to resort to concrete.

For the work, four classes of stone were called for: Class 1, stones weighing from 10 to 20 tons, for armour, contract price \$1.74 per ton; Class 2, stones of $\frac{1}{2}$ ton to 10 tons, for building up the reduced sections of the enrockment, \$1.56 per ton; Class 3, stones ranging from 3 lbs. to 500 lbs., delivered in loaded skips on flat cars and employed to level off the top of the rough mound to form a base for the concrete cap, \$1.50 per ton; Class 4, clean crusher-run stone or washed river gravel, used for concrete, \$1.50 per ton. The greater portion of the large stone used was a close-grained igneous rock, weighing as much as 198 lbs. per cu. ft.

In placing the cap, the enrockment was brought to an elevation averaging 2 ft. less than finished grade, Class 2 stone being used. Voids were then filled with Class 3 stone, and the

Humboldt Bay Jetties



Photo 5. South Jetty, June, 1917. Side View of Jetty Head, showing Concrete Monolith, 950 tons in weight. Tide near high water.



Photo 6. South Jetty, looking shoreward from point 1,400-ft. from outer end, showing succession of breaches in superstructure. July, 1920. Tide + 4.5-ft.



Photo 7. South Jetty, looking shoreward from point 500-ft. from outer end. July, 1920.

Humboldt Bay Jetties—continued

Photo 10. Sea breaking on head of North Jetty. Such seas from off-shore, caused by distant storms, often come in during prevailing fair weather on shore. July, 1924. Tide + 2-ft.

top levelled off 8 or 10 ins. below grade. Holes were choked by hand-placed pieces. Rough timber forms outlined the sides of the crown block, the front end being protected by a temporary rock dam. Concrete was mixed rather dry and was deposited from a 1-yard, self-righting bucket, handled by the stone-unloading crane. After the concrete was brought to within an inch or two of the level of the bottom of the wooden ties, the end tie was brought to grade, the rails laid, the ties placed and spiked, and the concrete then brought to the top of the ties.

The mixer was mounted on the end of a standard gauge flat car, with the discharge shoot delivering over the end. Fresh water was supplied by gravity from a tank on the same car. A fuel tank and a day's supply of cement were also carried on this car. A 1:2½:5½ mix was used throughout. The jetty crew worked six 8-hour shifts per week, and varied from 40 to 50 men.

Observation of the effects of wave action on the original enrockments had shown that destruction most frequently started at the outer ends of the structures, where the side slopes



Concrete Plant, North Jetty. October, 1927. View from mixer platform at head of incline, showing part of incline, storage platform for cement, batch box for dumping cement, sand and gravel hopper, and locomotive crane. View also shows siding on which up-bound car passed down-bound car.

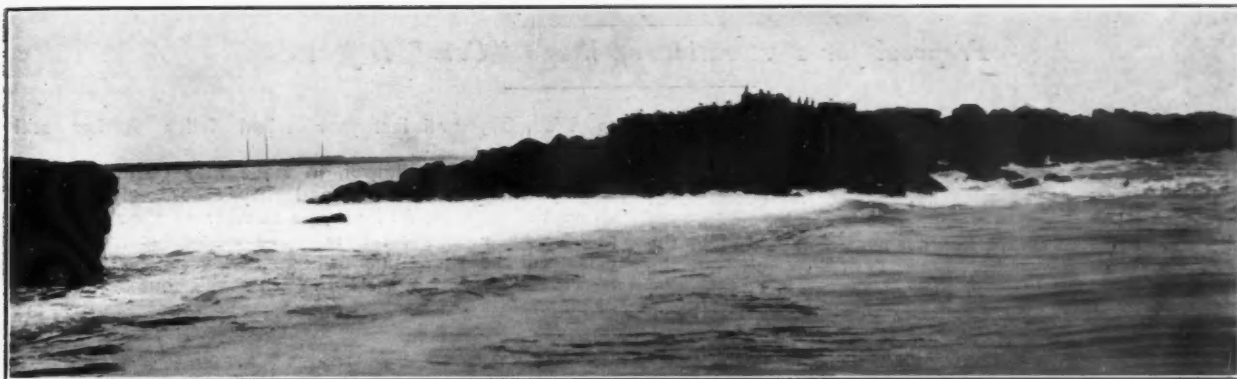
Humboldt Bay Jetties—continued

Photo 8. South Jetty, from South side, looking across Channel towards North Jetty, showing breach in enrockment shoreward of Concrete Jetty Head. July, 1920. Tide + 4-ft.

would be reduced and the armour pieces displaced. Once the armour was pierced, the smaller stone of the core or hearing was, of course, soon washed out, and the entire structure began unravelling progressively.

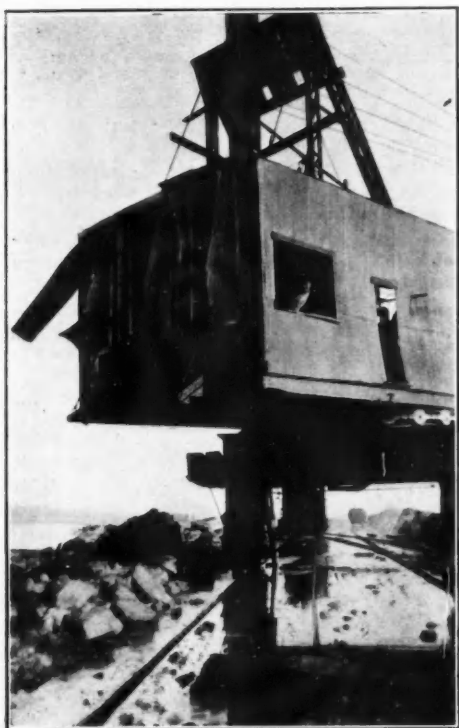


Photo 9. Humboldt Jetties. Rear of gantry crane and cabin after being struck by wave while working on North Jetty. Siding of galvanised iron damaged. Level of window 36-ft. above water. Cabin was frequently damaged but not so severely as in this instance.

In order to prevent the disintegration of the outer end, a reinforced concrete monolith, weighing about 950 tons, was constructed as a jetty-head (Photos 2, 3, 4 and 5). This was done in 1915, as the rehabilitation of the south jetty approached completion. The block was surrounded by 20-ton stones to protect its rubble foundation.

At this stage the channel afforded a depth of 23 ft. at mean low water.

In order to secure a safer working platform for the repair crew, the elevation of the concrete cap on the south jetty was fixed at 13 ft. above low tide for its inshore portion, this being increased to 15 ft. over the seaward section. For the north jetty these elevations were fixed at 15 ft. and 19 ft. respectively.

Another safety feature, dating back to this period, was the installation of a "palisade" or barrier of heavy armour stones, set in a single row between the track and the exposed slope of the enrockment, the south face in each case (Photo 10). This continuous barrier, standing four or five feet above the crown level, provided additional protection to men and machinery over the outer 3,000 ft. of each jetty. This has proven such a useful feature it is still being maintained.

While the south jetty was being restored the north enrockment had gradually been disintegrating under punishment. The same reasons that led to its original construction com-

pelled its rehabilitation. It was only too clear that both jetties were required to hold the entrance.

Reconstruction operations on the north jetty, including a concrete cap, began in 1915-16 with stone deliveries, averaging about 1,000 tons per day. During this period the structure was re-built for about 2,600 ft. Immediately some of the rebuilt portion was carried away by storms, and in spite of the south jetty concrete crown and head, they also demolished the superstructure of that enrockment to the extent of about 30,000 tons, which the engineer estimated would cost \$60,000 to replace.

It had been expected that, with the extension of the north jetty and the consequent confinement of that portion of the ebb which had been passing over the demolished enrockment, the channel would be scoured seaward in a more nearly straight line. However, these hopes were disappointed, for the channel, remaining about 23 ft. deep, crowded around the end of the south jetty where scour increased the depth from 14 ft. to 31 ft.

Up to June, 1917, the reconstruction project had cost \$1,963,000, including maintenance charges of \$404,000, covering replacement of new stone and concrete washed away.

For the ensuing eight years the history of this project reveals a constant struggle to hold the two enrockments in spite of inadequate appropriations and more than adequate storms (Photos 6, 7, 8 and 9). For the first two years of that time the World War, of course, diverted normal appropriations, and the dislocation continued until 1921.



Humboldt Jetties. Concrete Plant, North Jetty, October, 1927. View from gravel hopper, showing part of platform for cement storage, batch box for dumping cement, incline and mixer. Concrete for monoliths was hauled in ships loaded on flat cars.

The report for the year ending June 30th, 1919, shows the north jetty complete to within 500 ft. of its outer end. For the unbuilt portion 190,000 tons of stone are estimated as being required. The same report cites the south jetty as being badly damaged, with estimated repairs involving 16,000 tons of stone, 370 ft. of concrete cap and 5,000 ft. of track—or total damages of \$71,000. The estimate also called for additional shore protection work on the head of the south spit, 18,400 tons of stone being required; at the post-war prices then prevailing this involved an outlay of about \$55,000.

The 1919 report also cites the north jetty as requiring 75,000 tons of stone for shore protection, or \$225,000, and 2,500 ft. of trestle at \$8.00 per foot, or \$20,000.

(To be continued)

Clyde Navigation Trust

Proposal for Restoration of Wage "Cuts" Defeated

AT a meeting of the Clyde Navigation Trustees on May 1st, consideration was given to a proposal by one of the members, who represented the Corporation on the Trust, to the effect that the 5 per cent. "cut" which was made in the wages of a section of the employees in 1931 should, in view of the recent improvement experienced in the trade of the Port, be restored as and from July 1st, the beginning of the new financial year. The motion, however, was defeated by a large majority, it being pointed out that a large proportion of the Trust's employees have suffered more from the necessity to work short time than from the modification in wages rates, and it would therefore be unfair to give the advantage in wages to the men in continuous employment so long as the large majority could only obtain two weeks' work in three.

Councillor J. Stewart, who submitted the motion, stated that the Clyde Trust was one of the first bodies in the country to make a cut in their employees' wages, and he had protested at the time against this cut, one of his reasons being that he considered the Management Committee might have conferred with the employees' representatives before they brought in their recommendation.

Taking into consideration the fact that the employees have been subject to the cut in wages for a longer period than those of other public bodies, he thought they should take the first opportunity of restoring the full wages. The Government had given them a lead, and various commercial companies had also taken the same line and there was, in fact, a general movement all over the country to restore wages now that industrial and commercial conditions were improving.

Councillor Stewart then mentioned that the return, which was before them that day for the nine months of the current year, showed that there had been an improvement in the revenue of every department of the Trust, and that there was an increased revenue of over £32,000 for this period. This was very encouraging, and he thought they might take it that the improvement in trade, and with it the improvement of the Trust, would go on, so justifying a revision in the present wages.

Councillor Hector M'Neill, in seconding the motion, criticised the administration of the Trust as having failed to realise the fullest measure of development of their properties in the vicinity of the Shieldhall Dock. He had made enquiries and had formed the opinion that the Trust had not done all they might have done to increase their revenue through the development of the land at Renfrew. He was told that they had 133½ acres in that district which was available for sale or letting, and he had been informed that the Committee which had been dealing with the matter, had only had two meetings, one towards the end of 1931 and the other on March 20th of this year. He considered that if the Trust had taken the opportunities afforded them of developing that area, they might not have required to cut wages at all. They knew that at Trafford Park, Manchester, many new factories had been started in 1933, but it seemed to him that the Trustees had not been making any effort to attract new industries to the district, and he considered that, with proper exploitation of the land available, they might have been able to fill up the gaps in the trade revenue of the harbour.

Councillor M'Neill, continuing, said there was a general movement in industry and commerce to-day, to meet the claims of employees for improvements, and he had been informed that one of the largest commercial businesses in the country was proposing to introduce a system of a shorter working week for employees, viz., a five-day week with no reduction in wages. He considered that the Clyde Trustees might well have regard to such examples in the treatment of their employees.

In the absence of Mr. W. F. Robertson, the chairman, Mr. William Cuthbert, the vice-chairman presided, and moved as an amendment that the time had not yet come when the Trustees could take such action with prudence. They all sympathised with a desire for a restoration of the wages deduction, but his suggestion was that the time was not yet opportune. The General Purposes Committee were unanimously of the opinion that though the revenue was improving, they could not afford to incur such a considerable expenditure as would be necessary if the wages of the workpeople were to be restored to the former levels.

In 1931 the Trustees had found it necessary to review the whole financial position, and the wages cut had been forced upon them by the serious fall in their revenue. The revenue for the year 1928-29 was £1,059,000; in 1929-30 it was £1,012,000; in 1930-31 it had fallen to £865,000; and although they had made economies in that year, the succeeding twelve months, 1931-32 showed that the revenue had again gone down

to £768,000; and last year it had fallen further still to £733,000.

Owing to the falling-off in trade they could not find full employment for the men, and they accordingly had to face either the paying-off of a large number of their employees or putting them on short time. The employees themselves had preferred the short-time arrangement, and the Trustees had agreed to give them work in two weeks out of three. That arrangement had continued for some time. After putting most of their workpeople on short time, the question then arose concerning a small section of the employees who were still continuing on full time, and the result of that was that an arrangement was arrived at to have a cut in wages and salaries of 5 per cent. It was now obvious that they could not fairly restore the 5 per cent. cut until they were nearer the position of giving full employment to the large majority of their workmen who were still employed on short time.

Regarding the improvement in revenue they were all delighted to note that matters had taken a turn for the better, but they did not know yet whether the expenditure was to work out in the same way. Last year, Mr. Cuthbert recalled, they had closed the account with a balance of £18,000 on the wrong side. Their General Manager had interviewed the leaders of the men early this year when they had represented that the "cuts" might be restored, but after he had explained the position fully to them he gathered that they were satisfied that the time had not yet come when the Trustees could restore the "cuts."

Regarding Mr. M'Neill's comments suggesting that they might have done more in developing the ground at Renfrew, which was available for industrial sites, Mr. Cuthbert stated that there had been a great deal more going on than appeared in the minutes. Negotiations had been carried out in different directions, but naturally negotiations of that kind could not be completed in a short space of time.

The Trustees, however, were fully alive to the advantages which might arrive by the development of their ground at Renfrew, and they had been in consultation to quite a considerable extent with the Chamber of Commerce and with the Development Board, and they were prepared to co-operate with anybody who could be helpful in the development of this area, but he did not think that anything more could be done other than had been done in that direction. It certainly seemed absurd to him to suggest that development might have been arranged that would obviate the necessity for the economies which they had had to practise in the last two years.

The amendment was seconded by Sir Thomas Dunlop, who said that, with all due sympathy for the workpeople, it was simply not an advisable time to make any change in the wages.

The Chairman, in answering Mr. J. M'Lean, said that the 5 per cent. reduction in wages had represented a saving of approximately £7,500 per annum. On the other hand, the saving they had made through the working of short time on the part of the larger section of their employees amounted to £35,000 per annum.

The amendment was carried by a large majority.

Welded Buoys: A New Steel Development.

In the May issue of *The Dock and Harbour Authority* there appeared on page 213 an illustrated article entitled "Welded Buoys: A New Steel Development."

The article mentioned that these welded buoys had been lately designed and manufactured by Messrs. Dorman, Long and Co., Ltd. We are now informed that Messrs. Dorman, Long and Co., Ltd., are the designers of the buoys only and not of the spindle for the mooring buoys. The patent for the spindle used in these mooring buoys is held by the Tyne Improvement Commission.

The Drainage, Dredging and Construction Co., Ltd.

A very interesting booklet has been issued by the Drainage, Dredging and Construction Co., Ltd., Public Works Contractors, 3, Gt. Winchester Street, London, E.C.2, and 24, Tuesday Market Place, King's Lynn.

This booklet depicts the various types of work which the Drainage, Dredging and Construction Co., Ltd., can carry out, and these comprise dredging, reclamation, land drainage, docks, harbours, quays, sluices, training walls, sea defence work, reinforced concrete construction, buildings, etc. There is also included illustrations of some of their plant which is available for carrying out the various types of work.

The Drainage, Dredging and Construction Co., Ltd., will be pleased to send copies of this booklet to any of our readers who are interested, upon hearing from them.

Dockyard Expense Accounts, 1932

Report of the Comptroller and Auditor General (G. C. Upcott) upon the Dockyard Expense and Manufacturing Accounts for the year ended 31st March, 1933; prepared and submitted for the information of the House of Commons in pursuance of Section 5 of the Exchequer and Audit Departments Act, 1921:—

Outcome of Account.

1.—The Programme of Shipbuilding, etc., presented to Parliament with the Navy Estimates for 1932 provided for an expenditure of £15,453,793. The actual expenditure in the year was £15,340,372, being less than the Estimate by £113,421. There was underspending on direct charges for Repairs, £176,871, and Stores for Maintenance, £227,136, partially offset by overspending on direct charges for New Construction, £66,248, and on Establishment and Incidental charges, £224,338.

New System of Expense Accounting.

2.—Reference has been made in previous reports to the changes involved in the revised accounting system in process of adoption at the dockyards.

In 1932 the revised system was in full operation at Portsmouth, Devonport and Malta, and in partial operation at Chatham and Sheerness. The account consequently embodies figures arrived at under two systems which differ widely in their operation.

From 1st April, 1933, the new accounting system was brought into full operation at Chatham and Sheerness, and introduced at Gibraltar and Portland, and in the present year it is being extended to Hong Kong, Bermuda and West India Docks.

At the smaller yards, where mechanical aids to accounting are not being used to the same extent as at the large home yards, the costing procedure applied at the latter has been abbreviated in certain particulars.

Expenditure on New Construction, Repairs, etc., 1928 to 1932.

3.—The general course of Naval Expenditure from 1928, as recorded in the Dockyard Expense Accounts, may be seen from the following table, showing the direct charges under the principal heads of account (omitting 000's).

	1928	1929	1930	1931	1932
New Construction:—	£	£	£	£	£
Dockyard-built ...	2,716	1,506	1,850	2,567	3,040
Contract-built ...	5,850	5,528	3,522	2,310	2,994
Other Vessels ...	309	16	24	40	72
Repairs, Alterations, &c. ...	5,094	5,059	4,172	3,632	3,297
Stores for Maintenance ...	1,374	1,395	1,224	876	930

It should be noted that the figures relating to 1929 and subsequent years have been compiled in progressively increasing proportions under the new system of accounting referred to above, which involved the transfer of certain types of expenditure from direct to indirect charge.

Police Pension Charge.

4.—In accordance with section IV. of 23 & 24 Vict. c. 135 the Admiralty provide in sub-head I, Vote 15, for a reasonable proportionate part of the deficiency of the Metropolitan Police Pension Fund, on account of police officers who have been discharged to pension from service in Naval Establishments. Hitherto, the charge in the Dockyard Expense Accounts for pensions of Metropolitan Police Officers has been the appropriate portion of this cash payment. The charge for Civil Pensions, on the other hand, has been assessed on a liability basis, i.e., as a percentage on the actual salary and wages charges.

The introduction of the new accounting system, involving modern costing methods, and the process of replacement of Metropolitan Police by Marine Police have together caused the Admiralty to review this inconsistency in the treatment of pension charges. The liability basis was regarded as preferable in itself, and it was felt that it was undesirable to burden costs under the new system not only with a percentage liability for Marine Police gratuities, but also with the continuing cash contributions in respect of the pensions of the Metropolitan Police whom they have replaced. The Admiralty decided therefore to limit the charge in the Accounts from 1st April, 1932, to an appropriate percentage on the emoluments of the police actually employed in the year. The considerable cash contributions towards the Metropolitan Police Pension Fund remain-

ing to be met from Vote 15 for many years will be disregarded and in so far as they relate to dockyards in which Metropolitan Police have been replaced (e.g., in 1932 Chatham approximately £20,000) they must be taken to reflect under-statement of costs in prior years since the inception of the Accounts.

Copies of this report (price 3s. net), giving full details, can be obtained from H.M. Stationery Office at any of the following addresses:—Austral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh, 2; York Street, Manchester, 1; 1, St. Andrew's Crescent, Cardiff; and 80, Chichester Street, Belfast.

Reduction in Harbour Dues at Blyth.

The Blyth Harbour Commissioners have had under consideration a revision of the harbour dues, and have decided that on and from June 1st they will make further reductions in the dues payable in respect of ships to all destinations. A very low due is in operation for ships either coming for repairs or bunkers only, and the coastwise rate will now be reduced to 4½d. The dues generally will be as follows:—

	Per Reg. Ton. Pence.
For every vessel entering and leaving without cargo	¾
For every vessel entering with cargo and leaving with cargo but not breaking bulk ...	¾
For every vessel entering without cargo, or with cargo, but not breaking bulk and taking Bunkers only, or for Docking or Repairs ...	¾
If with Cargo:—	Per Reg. Ton. Pence.
1.—From or to any place in the British Isles, the Isle of Man, or the Islands of Jersey and Guernsey, or in the Baltic Canal, or any place between the River Elbe and Brest ...	4½
2.—From or to any place in Europe between the River Elbe and the North Cape or in the Baltic Sea, or in the White Sea, Iceland, or between Ushant and the Straits of Gibraltar, inclusive, or British possessions in North America ...	6
3.—From or to any other place whatsoever ...	9

Launch of Portuguese Submarine "Delfim."

The first of the three Portuguese submarines building at the Naval Construction Works of Vickers-Armstrongs Ltd., at Barrow-in-Furness, was successfully launched on May 1st. The others were launched on May 30th.

This submarine has been named the "Delfim," and the launching ceremony was performed by Madame Santar do Amaral, the wife of one of the principal members of the Portuguese Inspection Commission stationed at Newcastle-on-Tyne.

These submarines were originally ordered in Italy, but later, owing to financial considerations, they were transferred to Vickers-Armstrongs Ltd., who had already secured the contract for the whole of the armament for the new Portuguese Naval Programme.

The "Delfim" is the 164th submarine to be launched from the Barrow Works, and is specially designed to meet the requirements of the Portuguese Navy.

The launch was witnessed by a large number of Portuguese Naval officers and their wives, who are in England in connection with inspection work, and also by British and Brazilian Naval officers and their wives, who are residing in Barrow. The British Admiralty were officially represented by Admiral Sir A. Percy Addison (Director of Dockyards).

Commander C. W. Craven, the Managing Director of the Works and Shipyards of the Company, who presided at the luncheon which followed the launch, warmly thanked Madame Santar do Amaral for her kindness in undertaking the launching ceremony, and presented her with a souvenir of the occasion.

The order for a British cruiser of the "Minotaur" Class, which has been placed with Vickers-Armstrongs Ltd., was referred to by the Managing Director of the Company, Commander C. W. Craven, R.N., who intimated that as a result of this addition to the Company's work, it would now be possible to put in commission again the Naval Yard at Walker-on-Tyne. On an average between 4,500 and 5,000 people up and down the country would be employed during the next 2½ years on this cruiser, and the similar ship ordered on the Clyde.

Bombay Port Trust

At a meeting of the Trustees of the Port of Bombay held on 24th April, 1934, the following were the main items of business disposed of:—

The Chairman laid before the Board a preliminary report on the Revenue Receipts for the year ended 31st March, 1934. The aggregate receipts for the year were Rs. 245.36 lakhs, or Rs. 3.71 lakhs less than the revised Budget Estimates framed in January last, the decrease being mainly due to reduction in the volume of exports of raw cotton from the docks wharves, increased overside shipment and diversion to other ports. Allowing for an anticipated saving in Revenue Expenditure of approximately Rs. 4 lakhs on the original Budget Estimates 1933-34, the deficit on the year's working is expected to be about Rs. 75,000, which will be met by withdrawal from the Revenue Reserve Fund.

The Board considered representations from the principal coastal shipping lines regarding the effect of the recent amendment of the Docks Scale of Rates restricting the scope of the concessional West Coast schedule of wharfage rates to transshipment of cargo between ports lying within the prescribed zone, particularly in respect to the traffic in cashewnuts, coffee, betelnuts, pepper and certain spices, and sanctioned suitable amendments of the Docks Scale of Rates reducing the wharfage charges on these commodities so as not to hamper the development of this entrepot trade.

An amendment of the B.P.T. Railway Goods Tariff was approved, providing for a reduction of through freight on rice and sugar from Rs. 5 per wagon to 2 pies per maund.

An estimated expenditure of Rs. 1,70,210 for renewal of rails and sleepers on the B.P.T. Railway during 1934-35 was sanctioned.

At a meeting of the Trustees of the Port of Bombay held on 8th May, 1934, the following were the main items of business disposed of:—

Government Notifications appointing as Trustees of the Port, Mr. I. H. Taunton, I.C.S., vice Mr. H. K. Kirpalani, I.C.S., resigned, and Mr. A. N. J. Harrison vice Mr. M. W. Brayshaw, proceeded on leave, were recorded.

Mr. W. R. S. Sharpe, M.Inst.T., chairman, was re-elected as the Port Trust representative on the G.I.P. Railway Local Advisory Committee for a term of two years from June, 1934.

Estimates of expenditure aggregating Rs. 32,700 were sanc-

tioned against budget provisions for special repairs and renewals of plant and dock gear and equipment.

Subject to the sanction of Government, certain amendments of the Docks and Bunders Scales of Rates were approved, to provide for special reduced rates in the West Coast schedules for tarpaulins, fireworks, agarbutti, etc., as the incidence of the former charges on a package basis were high and tended to arrest the development of the seaborne coastal trade.

The chairman referred to the retirement from the Board of Trustees of Mr. H. K. Kirpalani, I.C.S., who was first appointed as a Trustee in 1926; and had served on the Board for a total period of just over 3½ years. The chairman said that Mr. Kirpalani had always realised that the interests of Bombay demanded close and friendly co-operation between the Port Trust and the Municipality and this attitude had always characterised his dealings with the Port Trust and had often materially facilitated the settlement of difficult questions.

As a member of the Board Mr. Kirpalani's sound judgment and administrative experience had been of great value to his colleagues and to the administration as a whole.

Imports and exports at the Port of Bombay:—

	1933			1934		
	Import Tons	Export Tons	Total Tons	Import Tons	Export Tons	Total Tons
Docks ...	449,838	479,734	929,572	496,094	463,829	959,923
„ (trans-shipment)	18,039	34,364	52,403	21,883	76,270	98,153
Bunders...	281,125	93,120	374,245	274,998	84,267	359,265
Total ...	749,002	607,218	1,356,220	792,975	624,366	1,417,341
Total from 1st Apr. to 31st Mar.	2,783,896	1,905,338	4,689,234	2,974,388	2,297,374	5,271,762

Vessels other than ferry steamers, hired transports, Government vessels and country craft, which entered the Port of Bombay:—

	Quarter ended 31st March, 1933		Quarter ended 31st March, 1934	
	No.	Net Register Tonnage	No.	Net Register Tonnage
Vessels engaged in foreign trade ...	216	1,000,993	231	1,067,479
Vessels engaged in coasting trade ...	706	596,731	704	616,808
Total from 1st April to 31st Mar.	2,988	5,777,644	3,035	6,074,970

The Port of Amsterdam

The position of the Port of Amsterdam in regard to number of vessels and tonnage and to the goods traffic arrived and sailed, as compared with the corresponding figures of last year, is as follows:—

SEAGOING VESSELS AND TONNAGE.

	ARRIVALS				SAILINGS			
	No.	Per Cent.	N.R.T.	Per Cent.	No.	Per Cent.	N.R.T.	Per Cent.
Apr. 1933 ...	249		333,242		250		329,689	
„ 1934 ...	257		412,007		238		379,969	
	+8	+3.21	+78,765	+23.64	-12	-4.8	+50,280	+15.25
Mar. 1934 ...	258		400,329		266		381,756	
Apr. 1934 ...	257		412,007		238		379,969	
	-1	-0.39	+11,678	+2.92	-28	-10.53	-1,787	-0.47
Jan-Apr. 1933	1,037		1,494,155		1,039		1,521,656	
„ 1934	1,042		1,565,658		1,045		1,555,832	
	+5	+0.48	+71,503	+4.79	+6	+0.58	+34,176	+2.25

SEAGOING GOODS TRAFFIC. (In Tons of 1000 Kilos*).

	1		2		3		4		5	
	Import	Transit incl. in col. 1	Export	Transit incl. in col. 3	Total col. 1 & 3		Import	Transit incl. in col. 1	Export	Transit incl. in col. 3
Mar. 1933 ...	313,180	80,669	169,629	58,508	482,809		313,180	80,669	169,629	58,508
„ 1934 ...	319,694	73,443	144,495	68,893	464,189		319,694	73,443	144,495	68,893
	+6,514	-7,226	-25,134	+10,385	-18,620		+6,514	-7,226	-25,134	+10,385
	+2.08%	-8.96%	-14.82%	+17.75%	-3.86%		+2.08%	-8.96%	-14.82%	+17.75%
Feb. 1934 ...	324,712	60,280	127,863	56,326	452,575		324,712	60,280	127,863	56,326
Mar. 1934 ...	319,694	73,443	144,495	68,893	464,189		319,694	73,443	144,495	68,893
	-5,018	+13,163	+16,632	+12,567	+11,614		-5,018	+13,163	+16,632	+12,567
	-1.55%	+21.83%	+13.01%	+22.31%	+2.57%		-1.55%	+21.83%	+13.01%	+22.31%
Jan.-Mar. 1933	879,715	182,926	401,777	141,744	1,281,492		879,715	182,926	401,777	141,744
„ 1934	940,174	181,617	417,823	156,213	1,358,002		940,174	181,617	417,823	156,213
	+60,459	-1,309	+16,051	+14,469	+76,510		+60,459	-1,309	+16,051	+14,469
	+6.87%	-0.72%	+3.99%	+10.21%	+5.97%		+6.87%	-0.72%	+3.99%	+10.21%

* These figures have been taken from the monthly statistics of the Central Bureau, The Hague, Holland.

Classified according to flag the number of vessels which entered the Port of Amsterdam during April, 1934, was:—

Dutch, 128; Great Britain, 45; German, 38; Swedish, 14; Norwegian, 12; Danish, 2; American, 1; French, 2; Greek, 3; Finnish, 2; Italian, 6; Estonian, 1; Belgian, 1; Dantzig, 2.

Vessels laid-up at Amsterdam:—1st April, 1934—17 vessels, measuring 66,460 tons gross; 1st May, 1933—35 vessels, measuring 184,132 tons gross; 1st May, 1934—17 vessels, measuring 75,134 tons gross.

London's Shipping.

During the week ended May 11th, 1,174 vessels, representing 986,431 net register tons, used the Port of London. 527 vessels (787,953 net register tons) were to and from Empire and Foreign Ports, and 647 vessels (198,478 net register tons) were engaged in coastwise traffic.

* * * *

During the week ended May 25th, 1,073 vessels, representing 939,217 net register tons, used the Port of London. 534 vessels (738,324 net register tons) were to and from Empire and Foreign Ports, and 539 vessels (200,983 net register tons) were engaged in coastwise traffic.

Tilbury Passenger Landing Stage.

During the month of April, thirty-nine vessels, totalling 407,339 gross register tons, used the P.L.A. Tilbury Passenger Landing Stage.

Bremen's Seagoing Shipping Traffic during March, 1934.

In March, 1934, 521 sea-going vessels with a carrying capacity of 663,488 net registered tons, against 566 vessels with 567,323 net registered tons in March, 1933, and 429 vessels with 579,810 net registered tons in February, 1934, arrived at Bremen ports. In this connection vessels which ran into several Bremen ports one after the other, have only been counted once. Arrivals in the Bremen city harbours in March, 1934, were 482 vessels with 460,060 net registered tons, against 525 vessels with 418,506 net registered tons in March, 1933, and in Bremerhaven in March, 1934, 63 vessels with 201,335 net registered tons, against 62 vessels with 157,284 net registered tons in March, 1933.

Recent Legal Decisions

IMPORTANT as the judgment of the House of Lords in *L. and N.E. Railway Co. v. The British Trawlers' Federation and Others* is, it does little to settle any general right or principle. It goes no further than construing certain private Acts of Parliament. This is evident when we recall that in the Hull case (*London and North-Eastern Railway Co. v. Chester and Son*, 147 L.T. Rep. 308) where the Railway Company took the offensive and obtained declarations which, in substance, allowed them to keep fish-carrying motor vehicles out of their docks (except on such conditions as they might impose) the Company were victorious, and there seems to have been no appeal. Each case of this kind seems, therefore, to depend on a succession or net-work of private Acts, and on the question whether this or that undertaking has incorporated in its charter certain vital provisions of the Harbour and Docks and Piers Clauses Act of 1847.

Section 33 of the Harbour and Docks and Piers Clauses Act of 1847 enacts that: "Upon payment of the rates made payable by this and the Special Act and subject to the provisions thereof, the harbour, dock and pier shall be open to all persons for the shipping and unshipping of goods and embarking and landing of passengers."

Now, in the *Lowestoft* case the Railway Company, in virtue of the powers in their Special Act which enabled them to regulate admission to the docks, issued a circular intimating that no motor or horse-drawn vehicle would be admitted to the dock area unless drawn by themselves, but that they were prepared to give admission permits to other vehicle users on condition that no fish should be carried away in the licensed vehicles, except such as was consigned for transit by rail within certain limits.

In the Hull case the Company's Special Act conferred on them prohibitory powers, whereas in the *Lowestoft* case their powers being only regulatory, the objectors had a more favourable ground for opposition. Mr. Justice Branson decided that the Railway Company's proposed licensing system was not without the above-quoted provisions of the Harbour and Docks, etc., Act. He held that the "shipping and unshipping of goods" just meant that and nothing more, and the Company were not obliged to give facilities for the sale of fish at the docks. On appeal it was, however, ruled that the words "shipping and unshipping" were not to be confined to the mere narrow operation of lifting goods from the quay to the ship or the ship to the quay, and in particular that "unshipping" at this particular dock included getting

goods and bringing in vehicles to take them away. This comprehensive, and at first sight, surprising construction of a very simple phrase was explained by the circumstance that when the Great Eastern Railway, in 1862, took over the Lowestoft dock a statutory market was already in existence there; a market was therefore part of their undertaking and unshipping at a market implies sales.

As to this judgment generally, we respectfully concur in the observations made by a commentator in the *Law Times Journal* with regard to the variations to be found in the private Acts of the Railway Companies. The law definitely is, that where you have statutory bodies of this kind their rights and obligations must be ascertained by looking at their statutes and not elsewhere. The result in this instance is such as to tempt us to criticise the system of legislation by private Acts. At Hull the draftsman uses the words: "Prohibit the entrance or access to the said quays." At *Lowestoft* he writes:—"Regulate the times of entry to the said dock"—or some such words. How wide the difference between them we can see when we read the two decisions—that of the House of Lords and that of Mr. Justice Branson in the Hull case, which has not been challenged. Surely this is a case for uniform legislation throughout the country.

Either the growing industry of motor transport ought to be allowed to do this work at all statutory docks and harbours, or it should not. We have a great respect for vested interests; but this is, we think, a question of public policy in which vested interests, however respectable, should give way. The question should not be left to be decided for each dock and harbour in the country by a series of single combats in the Courts or fought out on narrow points of construction. It is too big for that. The operators of motor transport are seeking everywhere for fresh spheres and outlets for their energies. In all the old industries in which transport plays a large part the railways are there before them and usually well entrenched. It is a commonplace of our trade to-day that the new industry is supplanting the old, which, until the Road and Rail Traffic Act was passed, was unfairly handicapped in the competition. Nowhere is it keener than at the ports; and nowhere are the railway companies in possession of stronger strategic positions. The latest decision of the House of Lords shows, however, that at one port, at all events, the railway company can claim no monopoly of carriage and cannot prevent, though they may regulate, the approach of motor vehicles to the docks which they own, and over which they have statutory powers of control.

The Port of Halifax

Review of Port Traffic during the Month of March, 1934

Shipping.

During the month of March, 1934, a total of 457 vessels entered and cleared the Port of Halifax, as compared to 398 for March, 1933 and 369 for March, 1932. The net registered tonnage is reported at 1,304,992 tons, as compared to 1,084,551 tons for March, 1933, and 881,409 tons for March, 1932. The number of vessels engaged in the Trans Oceanic service entering and clearing during the month of March, 1934, totalled 227, as compared to 195 for March, 1933, and 159 for March, 1932. The number of vessels engaged in the coastwise trade entering and clearing during the month of March, 1934, totalled 230, as compared to 203 for March, 1933, and 210 for March, 1932.

Since January 1st, 1934, the total number of vessels arriving and departing at the Port of Halifax is reported at 1,261, as compared to 1,189 for the same period of 1933, and 1,198 for the first three months of 1932.

Cargo Tonnage.

With a total of 288,709 tons of cargo handled inward and outward through the Port of Halifax during March, 1934, a further all-time record for any one month was established. The previous all-time monthly record was established in December, 1933, with a total of 214,444 tons. The record established in March, 1934, is thirty-five per cent. greater than for any previous month on record.

Since January 1st, 1934, the total cargo tonnage handled inward and outward amounted to 671,936 tons, as compared to

425,654 tons for the same period of 1933, or an increase of sixty per cent.

Passengers and Mail.

The total number of passengers landed and embarked at the Port of Halifax during the month of March, 1934, is reported at 2,866, as compared to 2,817 for March, 1933. Since January 1st, the passenger traffic is reported at 7,119, as compared to 7,331 for 1933.

The quantity of mail handled during the month of March, 1934, is reported at 22,127 bags, as compared to 16,401 bags for March, 1933. Since January 1st, the mail traffic is reported at 56,130 bags, as compared to 57,399 bags for 1932.

Apple Shipments through Halifax make New Record.

A total of 1,882,153 barrels of Nova Scotia apples shipped through the Port of Halifax during the season that ended early in April, constitutes a record for that class of cargo in one season. Last year's total of apple shipments through the port was 741,855 barrels. Consignment of 516,098 barrels to London made that port the most important destination of the season's shipments. Liverpool received the next largest shipments, totalling 415,145 barrels.

Prospects for the 1934-1935 season are that exports will fall far below the past season, in which the Annapolis Valley's production reached a total of 2,750,000 barrels. It is now estimated that next season's production will not exceed half that figure.

Port of Southampton Topics

Decreases in Dock Statistics for April.

A check on the recent increases in Southampton Docks statistics was recorded during April. The returns issued by the Southern Railway show that there were decreases in the number of ships and tonnage as well as in the volume of cargo and passenger traffic handled during the month.

The decreases are not very heavy in the first three instances, but the passenger figures show a big drop.

The number of passengers inward totalled 15,744, as compared with 17,400 in the corresponding month a year ago, and the outward total was 10,296, as against 14,599. There was thus an aggregate decrease of nearly 6,000.

It is always difficult to point to the exact causes of a decline such as this, but doubtless the principal explanation is the depressed state of the passenger business on the North Atlantic. In this connection it may be mentioned that three or four sailings were cancelled during April. Another factor which may assist in the explanation is that some of the mammoth vessels which previously have proceeded to Southampton direct have recently been calling at Plymouth to land passengers and mails before calling at Cherbourg and terminating their voyage at Southampton.

The number of vessels handled during April was 196 inward in comparison with 216, and 194 outward, compared with 211 in the corresponding month in 1933.

The tonnage returns, however, did not fall by a very marked amount. Inward gross tonnage amounted to 1,139,886 tons, and outward to 1,163,566 tons, as against 1,219,462 tons and 1,251,976 tons respectively. The decreases were, therefore, 79,576 tons inward and 88,410 tons outward.

The net tonnage figures declined by 62,218 tons inward and 60,855 tons outward. The inward total was 601,062 tons, and the outward total 615,275 tons.

The cargo traffic slumped by 2,831 tons inward, but showed an increase of 478 tons outward. Imports dropped from 31,975 tons in April, 1933, to 29,144 tons, and exports rose from 23,522 tons to 24,000 tons.

The number of troops inward during the month was 2,986, as compared with 1,124, and outward there was one sailing which accounted for 1,524. In April, 1933, there was no departure.

North Atlantic Passenger Traffic.

Although there was a feeling in shipping circles that the coming North Atlantic passenger season might show a slight improvement in comparison with last year, early indications do not point in that direction.

Passenger figures in respect of five of the principal shipping companies on the Western Ocean indicate that during the first three months of the year there has been a decrease of nearly 5,000 in the number of passengers carried. There were during that period eight fewer sailings than in the corresponding period of 1933.

It is interesting to notice, in examining the figures, that increases have been recorded in the case of super-cabin ships, whereas those without recent additions of that class have experienced a loss in the number of people carried. This shows that the trend is in the direction of reduced passage rates, such as are levied in respect of cabin ships of the type indicated without any undue sacrifice in luxury or speed.

During the first three months of 1934 the United States Lines had one sailing less than in the opening quarter of 1933, yet they carried 1,480 more passengers, the increase being marked both east-bound and west-bound. This state of affairs is no doubt due to the fact that the United States Lines have two such popular super-cabin ships as the "Manhattan" and the "Washington."

The White Star Line operated the same number of sailings during the first quarter of the year as in the corresponding quarter of 1933, and their total of passengers shows an increase of 555. Once again super-cabin ships are likely to afford the reason for the increased volume of traffic, for the White Star Line are the owners of the "Georgic" and the "Britannic," two very popular vessels.

During the same period the North German Lloyd had six fewer sailings and carried 3,355 fewer passengers. The Cunard Line also suffered heavily, for although they had two sailings less their passenger total dropped by 2,685. The Canadian Pacific had one sailing more and carried 900 fewer passengers.

More French and German Vessels may call at Southampton.

Negotiations which may result in more German and French ships calling at Southampton are in progress.

A number of important Southern Railway officials have just returned from Bremerhaven, where they have been discussing with the heads of the North German Lloyd the question of the express ships of that Company coming to a berth in Southampton Docks on their east-bound voyages from New York to Bremerhaven instead of disembarking passengers by tender in Cowes Roads.

At present the Company's express vessels on the North Atlantic service call at the docks on their west-bound voyages. They began this plan some little time ago when special berthing rates were offered for ships which came to the docks but did not remain alongside for more than three hours.

It is expected that the North German Lloyd will reach a decision on the matter within the next week or so.

Meanwhile, the Southern Railway are in negotiation with the Compagnie Generale Transatlantique which has an eye on Southampton as their British port of call instead of Plymouth.

If an agreement is reached it would have the effect of bringing to Southampton such famous vessels as the "Ile de France," "Paris," "Champlain" and "Lafayette," while later would come the 75,000-tons super liner "Normandie," which is at present under construction.

Port of London Authority

London's Shipping.

During the week ended April 27th, 1,139 vessels, representing 971,595 net register tons, used the Port of London. 510 vessels (769,520 net register tons) were to and from Empire and Foreign Ports, and 629 vessels (202,075 net register tons) were engaged in coastwise traffic.

During the week ended May 4th, 982 vessels, representing 881,433 net register tons, used the Port of London. 509 vessels (669,862 net register tons) were to and from Empire and Foreign Ports, and 473 vessels (211,571 net register tons) were engaged in coastwise traffic.

During the week ended May 18th, 1,037 vessels, representing 984,827 net register tons, used the Port of London. 524 vessels (797,382 net register tons) were to and from Empire and Foreign Ports, and 513 vessels (187,445 net register tons) were engaged in coastwise traffic.

Dock Entrance Re-opened.

The Port of London Authority announce that the Western Entrance to the Royal Victoria Dock has been re-opened for barge traffic. The entrance has been closed for some time in connection with the construction of the new Victoria Dock Road Scheme, which will revolutionise road access to the Royal Docks System and will speed-up enormously the great volume of traffic in the dock area of London generally.

Apple Accommodation at Surrey Commercial Docks.

The Port of London Authority have sanctioned the erection of a new shed at the Surrey Commercial Docks in order to provide additional accommodation for apples by vessels of the Cunard Line.

London's Shipping Increase.

Shipping figures just issued for the year ended 31st March last show that the total tonnage of vessels which arrived and departed with cargoes and in ballast at and from all ports of the United Kingdom was 339,461,735 N.R.T., compared with 327,318,344 N.R.T. last year. This shows an increase of 12,143,391 N.R.T., representing 3.7 per cent.

London's shipping increased by 6.7 per cent., the tonnage being 57,470,156 N.R.T., as against 53,860,115 N.R.T. during the previous year. This is only 1.7 per cent. less than London's record year of 1930, when the tonnage was 58,451,685 N.R.T.

The figures for others ports are as follows:—

	1933 N.R.T.	1934 N.R.T.
Liverpool	31,225,611	33,180,438
Southampton	21,988,530	24,879,764
Hull	10,934,459	11,398,058
Manchester	6,844,035	7,022,694
Bristol	6,188,455	6,502,594